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Strategic Lobbying and Taxation Choice  
—A Political Economy of Trade Policy  
Analysis

by

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## Summary

In this thesis, I use a political economy of trade policy approach to analyze the issues of strategic lobbying and taxation choice. The thesis contains 4 papers together with an introduction, literature review and conclusion.

In Chapter 3, a lobbying-influence model is presented to discuss how the outcomes of trade policy is influenced by lobbying activities during the policy-making process. A comparison of the welfare-maximizing model and the lobbying-influence model under a game theory framework is undertaken.

Chapter 4 provides a new explanation on the issue of asymmetric lobbying from the view point of the impact of external environment. Since the incentive of the domestic firm to engage in lobbying activities varies with its marginal costs, the outcomes of lobbying performance are different. This argument holds for both complete and incomplete information settings.

Chapter 5 considers whether there is a positive role for lobbying activities in an incomplete information setting when the foreign entry is incorporated. The results suggest that the social welfare under the pooling equilibrium is higher than that under the separating equilibrium. As a result, there is no positive role for lobbying activities in this two-period model.

Chapter 6 provides a political economy model to explain why trade taxes rather than more efficient income taxes might be adopted and what links the taxation choice and the economic development. In general, people prefers to pay less tax to the government. In a democratic society, a policy, which yields a higher utility to the majority of voters, is supported through majority voting. Therefore, the choice of taxation instruments depends on the tax payments, which are determined by the tax method, the income level, and the movement of income distribution over time.

# Chapter 1 Introduction

It seems that there is an enormous gap between what economists preach and what governments actually do in trade policy. Most economists believe that free trade is the best policy for a country. However, not all countries want, or are able to choose, a free trade policy (Baldwin, 1989; Krugman, 1989; Magee, 1997; Riezman and Wilson, 1995; Rodrik, 1995). In fact, trade policies are made in the political process so that there is a close relationship between economics and politics in trade policy formulation. Unfortunately, most economic models assume that the government only considers public interests and makes the optimal policy decisions by maximizing social welfare (Dixit, 1996; Mueller, 1997). In reality, government is a bureaucratic organization. Elected legislators, executives and bureaucrats not only have their own interests, but also have to coordinate with each other when policy is decided. Individuals in private sector can organize interest groups to lobby in order to influence policy outcomes as well (Lindblom and Woodhouse, 1994). That is why free trade is suggested in theory but protectionism is adopted in practice. As a result of this existing gap between academic and political community weakness, some economists have tried to incorporate a political dimension in the analysis of trade policy, with the aims of explaining and understanding policy-making process and improving policy proposals (Grossman

and Helpman, 1994; Magee, Brock and Young, 1989; Mayer, 1984; Magee, 1997; Riezman and Wilson, 1995; Rodrik, 1995).

In the political economy of trade policy literature, it is generally recognized that interest groups can influence policy outcomes through lobbying activities and that rent-seeking lobbying behaviour decreases social welfare (Bhagwati, 1982; Findly and Wellisz, 1982; Helpman, 1997; Krueger, 1974; Moor and Suranovic, 1993). The role of lobbying activities can be analyzed further in a strategic lobbying-influence model as follows. First of all, despite the fact that an interest group can influence the results of trade policy, the level of trade protection obtained by each interest group varies. We need to understand why different interest groups have different impact on policy outcomes and therefore why asymmetric lobbying occur. Secondly, regardless of the fact that lobbying expenditure is a kind of dead weight loss and that social welfare decreases in a complete information setting, lobbying activities can bring information about industry. We need to ask: Is it possible that there is a positive role for lobbying when information is incomplete? In addition, politics can not only influence the level of a protection policy but also the choice of a protection instrument among policy alternatives. Notwithstanding, many policies are available for a specific policy purpose. We need to explain why a specific policy emerges as a political equilibrium among the alternatives? For example, both trade taxes and income taxes can be collected in order to balance government budget. How is a taxation policy selected in the policy-making process? In this thesis, a political economy of trade policy approach is used to analyze these issues.



The thesis contains four papers together with an introduction, literature review, and a conclusion. Chapter 2 offers a selective survey of the political economy of trade policy literature, with a focus on five major political economy of trade policy approaches, asymmetric lobbying and the choice among policy alternatives. In Chapter 3, a lobbying-influencing model is built in order to discuss how lobbying activities influence the trade policy outcome in the policy-making process. In the political economy of trade policy literature, much research incorporates lobbying activities through the general equilibrium framework of the Heckscher-Ohlin model or the specific factor model in order to explain why trade protection is adopted (Findlay and Wellisz, 1982; Magee, Brock and Young, 1989; Mayer, 1984; Van Long and Vousden, 1991). However, game theory is also a good analytical methodology that can be applied to analyze the interaction between politics and economics (Myerson, 1997). Therefore, a lobbying-influencing model based on game theory is needed from the political economy of trade policy point of view. In the trade theory literature, strategic trade policy has already used game theory as a framework to discuss the implications of trade policy (Brander, 1995). The political economy model in this chapter assumes that policy is determined by firms through lobbying behaviour, while policy is decided by a welfare-maximizing government in the strategic trade policy model. Therefore, a comparison of the welfare-maximizing and lobbying-influencing models under the same game theory setting is presented.

Chapter 4 includes the result of analysis of why different interest groups have different impacts on policy outcomes in complete and incomplete infor-

mation settings. In the political economy of trade policy literature, much research has incorporated lobbying activities in order to explain why a government chooses protectionism rather than a free trade policy (Findlay and Wellisz, 1982; Grossman and Helpman, 1996). However, the issue of why the level of protection obtained by each interest group through lobbying activities varies is still unclear to us. Some explanations on why asymmetric lobbying occurs are provided in the public choice literature. On the one hand, the formation of an interest group, such as the number of firms and the heterogeneity of an interest group are key factors, determines its ability to influence policy outcomes (Olson, 1965; Long and Souberyran, 1996). At the same time, the competition among interest groups also influences the results of lobbying activities (Becker, 1983, 1985). On the other hand, the external environment must also have an impact on lobbying performance, but this perspective is generally neglected in the literature. Specifically, when domestic firms have different level of international cost competitiveness, the incentives for these firms to engage in lobbying activities are also different. That is why asymmetric lobbying occurs. This approach offers an alternative explanation to that presented in the current literature.

Chapter 5 is the report of an examination of whether there is a positive role for lobbying in an incomplete information setting. It is generally accepted that lobbying activities are a kind of rent-seeking behaviour, which may lead to a decrease of social welfare (Krueger, 1974; Bhagwati, 1982). However, lobbying activities can also provide information about industries, which may increase social welfare (Austen-Smith, 1990; Lindblom and Woodhouse, 1994). As a

result, there may be a positive role for lobbying activities in an incomplete information case. In the public choice literature, some research has investigated the issue of the positive role of lobbying when information is incomplete (Rasmusen, 1993; Lohmann, 1995; Largerlof, 1997). However, their models do not consider the possibility of potential entry. We need to notice that the actual and potential threats of foreign competition are important in the trade policy-making. Therefore, we incorporate potential foreign entry into the two-period lobbying-influencing model in order to understand the change of social welfare in an incomplete information case.

In Chapter 6, I discuss the choice between income taxes and trade taxes for different shapes of economic development under majority voting system. Evidence shows that tariffs are an important source of tax revenue in the early stage of economic development for almost every country, and income taxes are often adopted in the later stage of economic development (Baack and Ray, 1983; Conybeare, 1983; Riezmn and Wilson, 1995; Rodrik, 1995). That is to say, poor countries rely more heavily on trade taxes and the importance of tariffs decline with economic development. Since trade taxes are easy to handle in terms of lower collection costs, the more distorting trade taxes are used in the early economic development (Grant and Kimbrough, 1991). Once the protection tariffs are established, existing interests will fight against their removal. As a result, tariffs protection today may will be maintained tomorrow. A government cannot switch to more efficient income taxes easily (Brainard and Verider, 1993). However, the existing explanations neglect the following political economy issues. (1) How a taxation method is politically accepted as

a source of tax revenue. (2) The nature of the political economy relationship between different tax instruments and economic development. By assuming that policy is determined in a democratic society under majority voting, a political economy model is provided which offers a more complete picture of the choice among taxation methods. Finally , concluding remarks appear in chapter 7.

## Chapter 2: Literature Review

A large number of papers in recent years have considered various aspects of the political economy of trade policy. This chapter is not a comprehensive survey of all the literature but rather a selective survey concerning four main areas. The first of these areas, international political economy (IPE), is briefly reviewed in section 2.1. Specific attention is given to liberalism, nationalism and Marxism, which are three major IPE theories. Although all of these theories seek to explain many IPE phenomena and provide a sound conceptual framework, the resulting research has been more or less descriptive. The second of the areas, reviewed in section 2.2, concerns the explanations of how politics can influence the outcome of trade policy. Five major approaches are presented. Their main finding is that self-interested political actors such as politicians, interest groups and voters would pursue their own interests so that protection instead of a free trade policy is adopted in almost every country. Section 2.3 considers the issue of why the level of protection obtained by each industry varies. One possible answer is that different industries, declining and expanding industries for example, have different capabilities to organize lobbying activities, and therefore have different impacts on policy formulation. Section 2.4 looks at the issue of choice among policy instruments. We need to consider why a specific policy, say tariff policy, is chosen among all alter-

natives, although many policy instruments are available for the same policy purpose. Section 2.5 offers some conclusions.

## **2.1 International Political Economy**

International political economy (IPE) is concerned with the connection between politics and economics in international relations (Gilpin, 1987). In the field of IPE, there are three major schools of thought: liberalism, nationalism and Marxism. Based on individualism and rationalism, liberalism argues that the pursuit of self-interest will lead to the public good. Since the market can work very well, it should be free from political interference. Liberalism therefore argues that politics and economics are separate domains. Freedom is a crucial element in order to enable the invisible hand to operate, and the only thing that governments should do is to guarantee that individuals have equal freedom to pursue their goals. Free market, minimal state intervention, individual equality and liberty are the main themes in liberalism. Moreover, liberals argue that free trade is the best policy since everyone will gain from free trade, although not equally, according to their efficiency and factor endowment. Under a free trade system, specialization and the international division of labor increase individual productivity so that national and global wealth are accumulated and the consumption possibilities are enlarged.

In fact, the issue of free trade and protectionism lies at the heart of the conflict between economic liberals and economic nationalists. Liberals argue that each economy has a comparative advantage in some sectors of production and will therefore benefit from free trade. Through each economy doing what

it can do best, regardless of what that is, everyone can gain. For nationalists, however, who produces what is important. Nationalism argues that state regulation of economic activity in the interests of the national economy, thereby maximizing state power and wealth, is the best means of ensuring public welfare (Crane and Amawi, 1991). In other words, liberals and nationalists have different objectives and judge the success of policies according to different standards. Liberals judge trade and protectionism in terms of consumer welfare and the maximization of global efficiency. Nationalists stress the importance of state interests and the needs of national producers.

Marxism holds that political conflicts arise from the struggle among classes over the distribution of wealth. Capitalism is driven by capitalists striving for profits and capital accumulation in a competitive market economy, and labour has been dispossessed and reduced to a commodity that is subject to the price mechanism. Moreover, the expansion of capital accumulation at the international level develops the world unevenly. Each country grows at different rates and this differential growth of national power will lead to imperialism, war and change in the international political economy (Lenin, 1975). Although Marxism provides a more complete account of the interaction of economic, political and social factors, and hence broadens the scope of IPE. However, the analysis is historical and conceptual.

In general, the three theories are more or less normative and cannot be separated from their ideological foundations. Since economic policy is chosen by political agents through political process, a more analytical approach which

incorporates the policy-making process into the IPE framework, is needed.

## **2.2 Politics and Trade Policy: Five Approaches**

Since the outcome of trade policy is influenced by political actors in the policy-making process, Rodrik (1995) suggests that a political economy of trade policy must contain elements on the supply and the demand sides of policy formulation. On the one hand, not only do interest groups seek to gain some protection rents through lobbying and campaign contributions, but also individual voters take political actions to reinforce policy outcomes. On the other hand, trade policy is no longer decided by a benevolent dictator, who sets the optimal policy in order to maximize social welfare. Both the preferences of policymakers, such as winning an election, and the institutional structure of government within which policy-making takes place have an impact on the policy outcomes.

In the political economy of trade policy literature, there are five leading approaches which discuss the trade policy-making process: political support function, tariff-formation function, direct democracy, representative democracy, and influence-driven approaches. In general, these models take either the specific-factor model or the Heckscher-Ohlin model as a framework. The policy-maker is assumed to choose trade policies in order to maximize a certain distributional income, while individuals or interest groups take actions in order to shape the policy-maker's preferences.

### **(1) The political support function**



In this approach, a government is no longer viewed as a benevolent dictator which sets the optimal policy in order to maximize social welfare. The policy-maker is assumed to care about not only the efficiency consequences of protectionism but also the political influence of an organized interest group. In other words, the policy-maker optimizes a political support function which trades off the gains from protection to the industry against the efficiency losses to the public. If the gains of an industry and the losses of consumers are weighted equally, there is no difference between the political support and social welfare functions. The difference between a traditional model and a political support model exists only if the weights are different. Since different interest groups can offer different levels of political support to a government, for example through campaign funds, a government considers its own interests and decides whether or not it is worth redistributing income.

Hilman (1989) considers the situation in which tariffs are set by an incumbent government seeking to maximize its aggregate support. The government gains more support from consumers if the tariff, and therefore the price, is low. However, industry will provide more support if the tariff is high and, accordingly the industry's profit is also high. Although this approach clearly considers the objectives of policy-makers, it nevertheless neglects the explicit demand-side preference of politically influential actors. Moreover, it does not tell us explicitly about the formation of a political support function. Campaign contributions do not enter directly into the analysis, and the political competition of the next election is kept in the background. While the incumbent government maximizes its political support in the hope of being re-elected.

the election itself is not explicitly considered, nor are the positions of potential rivals.

## **(2) The tariff-formation function**

Since lobbying activities can influence policy outcomes, Findlay and Wellisz (1982) assume that the level of protection reflects the outcome of a competition between interest groups with different policy demands. In a specific-factor model, suppose that one interest group owns resources in an import industry which lobbies for a tariff, and another interest group owns resources in an export industry which lobbies against a tariff. Therefore, the tariff rate depends on the amount of resources devoted to lobbying by the supporters of protection and by the lobbying efforts of the opposition to protection. That is to say, the tariff-formation function relates the tariff rate to the two levels of lobbying effort. The tariffs are higher if the import-competing industry lobbies harder; the tariffs are lower if the other industry puts more effort into lobbying. However, the paper stipulate no conditions guaranteeing a positive tariff, leaving open the possibility that a negative tariff may prevail if the exported-good lobby is sufficiently strong. Notwithstanding, if the ownership of a sector-specific factor is more concentrated, the rate of protection is more likely to be higher. Wellisz and Wilson (1986) show that a positive tariff exists if the import-competing industry is relatively small, as measured by the national income possessed by its specific-factor owners, because the lobbying of the import-competing interest group is more effective than that of the export interest group. In general, the problem with this approach is that it fails to

consider the supply side of trade policy, as expressed in the preference of a government, and only the demand side of trade policy is analyzed.

However, Moor and Suranovic (1993) construct a strategic trade policy model with lobbying, which considers both the supply side and demand side of trade policy. The domestic government announces its subsidy in order to maximize total profits, net of subsidy payments and lobbying costs, at the first stage and the firm chooses outputs and lobbying contribution in order to maximize its own profit. Since lobbying costs are included, social welfare is necessarily lower than in the Brander and Spencer (1985) case. An export subsidy may not improve national welfare, because lobbying activities are a kind of rent-seeking behaviour. As a result, the result of the argument for strategic intervention is weakened when lobbying activities occur. However, this model still does not tell us explicitly about how the government's objective function is formed.

In the public choice literature, Rasmusen (1993, 1997) investigates the role of lobbying in an incomplete information setting. A two-player game between a lobbyist and a politician is considered. Suppose that nature chooses the preference of voters for a new policy. However, only the lobbyist knows whether the voters like this policy or not, and the politician does not have this private information. The lobbyist incurs a direct cost for lobbying, but not for lying. When lobbying occurs, the politician can use expenditure in order to verify the lobbyist's assertions. If there is no lobbying, the politician can pay for an independent investigation. The results suggest that lobbyists always

lobby if voters actually want the new policy. Otherwise, lobbyists only sometimes lobby. Politician might verify the information offered by the lobbyist, but will never investigate it independently. Therefore, lobbying can work as a signal. Similarly, Lohmann (1995) also argues that interest group lobbying plays an important information role. Policymakers are often imperfectly informed about the consequences of various policy alternatives. In this situation, lobbying activities may have an impact on political decisions because of their information content, and not primarily because of the contributions made by interest groups to policymakers. If the conflict between the policy-maker and the interest groups and the cost of sending a message are not too large, the interest group's information can be fully revealed prior to the policy-maker's decision.

Largerlof (1997) investigates the issue of when and for whom lobbying is welfare improving in the information transmission. Consider two interest groups A and B. B's income is certain but A's income depends on the state of nature. The government is willing to provide A with insurance if the state of nature is bad. However, the government does not know whether a good or bad state occurs. Each interest group can choose whether to spend expenditure on investigating the true state of nature and then report the information to the government. If the cost of information acquisition is not too great, there will exist an equilibrium where A investigates and then reports a bad state. Accordingly, the government will decide its transfer if the above equilibrium exists. Otherwise, the government makes its decision under uncertainty. However, lobbying is not necessarily welfare-improving, even where lobbying

provides information. When interest group A is worse off from his opportunity to lobby, the government cares about the well-being of interest group A and therefore compensates A for the costs of investigation by redistributing income between the two groups. As a result, B is worse off, because it has to share some costs of investigation. Since both A and B are worse off, so is the government. Moreover, it may also be the case that some people are better off from lobbying while others are worse off.

In addition, Maggi and Rodriguez-Clare (1998) investigate whether the presence of domestic political pressures may induce a government to unilaterally join a free-trade agreement. In a small country, two-sector model, suppose that capital is immobile in the short run but mobile in the long run, and that only one industry is able to coalesce into a lobby. Three possibilities are considered. First, if the government has a strong bargaining position and can offer protection in exchange for contributions from the lobby, more rent can be extracted from the political process. If the government has only a small amount of bargaining power, the distortions caused by protection cannot be fully compensated. Therefore, the government may commit to free trade. Secondly, an industry that is relatively inefficient might lobby for protection. If the economy starts from free trade, no capital is allocated to the inefficient sector. Hence, there is no lobbying for protection. If resources are invested in the industry initially, the industry could lobby in order to obtain protection. Thirdly, the political process may cause a distortion in the speed at which resources exit from a declining industry when an industry faces a negative shock. If the government can compensate for the distortion in the speed of

adjustment, firms will exit that sector at a slower rate than under free trade.

### **(3) Direct democracy: the median voter**

Assume that politicians are self-interested and desire to stay in office, then they will enact those policies that satisfy the majority of voters. Mayer (1984) uses the concept of majority voting over tariff levels, according to which a tariff is determined through the preference of the median voter. In a standard two-commodities model, assume that capital and labour are perfectly mobile, all markets are competitive, and the firm's production function is homogeneous of degree one. Suppose that all individuals have identical, homothetic preferences but differ in their relative factor endowments. Since factor ownership constitutes part of individual income, the relationship between a tariff and a given person's income share in turn depends on that person's endowments, as well as on the production structure through which factor returns and commodities are linked. The tariff rate is higher when the median voter's share of ownership of the sector-specific input is higher, when the sector output is larger, and when the slope of the import demand function is smaller. If the imported good is a labour-intensive product, a worker will favor an import duty, while a capitalist will favor free trade. Under a majority voting rule, protection would be the outcome if there are more workers than capitalists. If we can redistribute income and compensate losers without extra cost, free trade will be chosen since everyone is better off than they are under protection. If there exist voting costs, an industry prefers tariffs, because other interests may find that voting against protection is not worthwhile for the specific factor case. Nevertheless,

direct democracy is seldom used on broadly ranging multi-dimensional issues. Perhaps a better theory of trade protection requires a model which successfully marries electoral politics with pressure group politics.

#### **(4) Representative democracy: campaign contributions**

The first three approaches focus on how an incumbent government makes decisions within a political process. However, political parties seek office through election and therefore need resources to campaign in a democratic society. In order to improve the chance of being elected, each politician, who maximizes his probability of winning the election, will shape policies for special interests which must be implemented after the election. Interest groups evaluate their policy proposals and make campaign contributions to the party that promises them the highest level of welfare. The party uses these resources to sway the voters, who are imperfectly informed about the candidates positions and are ignorant of the consequences of trade policy, in order to increase the chance of being elected.

Magee, Brock and Young (1989) use a Heckscher-Ohlin model with two lobbies and two parties <sup>1</sup> to incorporate the above ideas. The parties are assumed to be either pro-trade or pro-protectionism, and each lobby represents one factor of production. Each party's election probability increases with the campaign contributions it receives, but decreases according to the level of policy intervention it commits itself to. The results indicate policy polarization, positive lobbying and Pareto inefficient allocations. However, this model has two

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<sup>1</sup>According to Duverger's law, there are two main parties under systems of plurality rule. See Osborne (1995).

shortcomings: there is an artificial restriction on the parties' platforms, which are either pro-export or pro-protection, and probabilistic voting is used without a rational-choice foundation (Austin-Smith, 1990). Moreover, Mayer and Li (1994) incorporate uncertainty in order to tackle both criticisms. Suppose that voters do not know exactly the policy preferences of the two parties, and the parties are uncertain about some aspects of voter preferences. Therefore, each party uses campaign contributions to clarify its position and to reduce uncertainty. Thus campaign contributions enhance electoral strength.

In addition, Clark and Thomas (1995) represent this model in a standard two-stage game framework. At the first stage, both parties choose their electoral platform simultaneously by taking into account the reaction of both lobbies. At the second stage, when the lobbies observe two policies, they simultaneously choose their lobby contributions to their own party so as to maximize their expected utility. If party 1's policy yields a higher sum of utilities than that of party 2, party 2 will change its policy position in order to increase support. By following exactly the same policy as party 1, party 2 can always guarantee itself an election probability of one-half; thus equilibrium is reached. In other words, both parties set identical policies and no lobbying occurs, so that the efficient allocation is obtained, which is in contrast to the results of Magee, Brock and Young (1989).

## **(5) The influence-driven approach**

Quite often, different political actors simultaneously try to influence the actions of the politician in the economic policy-making process (Dixit, 1996).



For example, legislators respond to different pressures, including those from voters, contributors and party officials. Therefore, a common agent approach, which describes a multilateral relationship, can be applied. Grossman and Helpman (1994) use this framework to model special interest groups making political contributions in order to influence an incumbent government's choice of trade policy. In a small open economy, each individual has identical preferences but different factor endowments. The factor owners in the same industry can organize an interest group in order to seek protection for the industry. In a two-stage non-cooperative game, the interest groups move first, offering politicians campaign contributions which depend on the policy positions of candidates, and seeking to maximize their own benefits. Then politicians choose their policies, knowing that their campaign money depends on their choice of policy outcome. There is no explicit competition among politicians, but there is a single incumbent who maximizes a weighted sum of total political contributions and aggregate welfare. An inverse tariff formation function is used in the sense that the contributions of interest groups are determined by the tariff rate. Each lobby sets its contribution schedule so that the marginal change in the contribution for a small change in policy matches the effect of the policy change on the lobby's gross welfare. The results suggest that the rate of protection in one sector is higher the more concentrated the ownership of the sector-specific in that sector, the less weight the policy-maker places on welfare relative to contributions, the larger the output level of the sector, and the flatter the import demand function.

This model is interesting, but it gives rise to some problems. First, if we

consider the structure of government, especially in terms of legislative organization, it might be suggested that different principals can find different agents (legislators) to pursue their interests, and that these legislators can together decide the policy outcome. As a result, the common agent approach is one way of trying to model the conflicting interests, but it neglects the role of the legislature. Secondly, the conclusions are based on a very general analysis of Bernheim and Whinston (1986). This high level of generality makes it difficult to say very much about the nature of the resulting political equilibrium apart from the fact that it exists. Since Bernheim and Whinston (1986) assume quasi-linear preference, which implies constant marginal utilities of income, and therefore the actions of the policy-maker are independent of the distribution of payoffs among principals. Dixit, Grossman and Helpman (1997) extend preferences with nontransferable utility, which is more suitable for a general analysis, and prove that the principals' truth-telling strategies constitute an efficient action in a Nash equilibrium.

Grossman and Helpman (1995) use the influence-driven contributions approach to characterize trade wars and trade talks. Consider the trade relation between two countries with similar political and economic systems. Each individual has identical, additively separable preferences. The government can tax or subsidize trade to effect any income redistribution between groups in the economy. Since some individuals own some specific factors, with their common desire for protection, they may choose to express their policy wishes to the incumbent government. Governments therefore bargain internationally, trying to get the best deal for their citizens and at the same time raising campaign

contributions from special interests, and then set trade policy. When governments negotiate trade policies, they are aware of the likely political response at home. In other words, governments set trade policies by facing each other in the international arena, and each government has to deal with its national political system. Negotiations over trade taxes lead special interests from an industry in the two countries to take opposing sides on the issue; each one of them wants to be protected at the expense of the other. Hence, they exert opposing pressures on the negotiating parties, and the winner is the lobby with the larger political clout. A change in the political environment in one country affects the resulting degree of protection in the other. Therefore, the trade policies of the two countries depend on both countries' political environments.

Taking a free trade agreement as an example, the interest groups, representing various industries, express their concerns by means of campaign contributions, and can voice their support or opposition to the agreement. Suppose that a country decides whether to join the agreement or not. An agreement requires both countries to select a joint regime to achieve political equilibrium. If joining provides higher welfare, then the government will be happy to sign an agreement in order to please its voters. However, it is not very likely that the agreement will be supported by all sectors. For example, exporting sectors, which expect to sell more in other countries, will support an open economy, while importing sectors, which expect to face fierce competition, will oppose the agreement. If some politically sensitive sectors can be excluded from the agreement and be allowed to maintain the original rates of protection, both countries are more likely to endorse an agreement. Moreover, both countries

may not have the same ranking of exclusions. When a conflict arises over the set of exemptions, the countries need to reach a compromise in order to enact a free trade agreement.

To sum up, according to the literature, political support, lobbying and elections are the three key determinants of protection. Different approaches consider different determinants in the formulation of trade policy. On the supply side of policy, policy-makers not only maximize social welfare, acting in the role of a benevolent dictator; they also maximize political support in pursuit of self-interest. On the demand side of policy, interest groups are willing to spend money in order to influence policy outcomes through lobbying. Moreover, voting behaviour and the desire to win elections show respectively the demand side of individual preferences and the supply side of political interests. A satisfactory treatment of all elements in the policy-making process still needs more research on these issues.

## **2.3 Asymmetric Protection**

In the previous section, we discussed how policy outcomes can be influenced by lobbying and elections in the policy-making process. On the one hand interest groups try to lobby government in order to influence policy outcomes favoring them; and, on the other hand, a political party proposes its policy position in order to attract votes and win an election. Although policy outcomes are influenced by politics, it is still unclear why protection is asymmetric. That is to say, the level of protection obtained by each interest group varies. In this section, we focus on the issue of why interest groups have different impact on

policy formulation and use declining and expanding industries as an example for more detailed discussion.

### **(1) The determinants of asymmetric lobbying**

In the political economy literature, two views are provided: the formation of interest groups and competition among interest groups. On the issue of the formation of interest groups for lobbying, Olson (1965) provides a classic analysis in The Logic of Collective Action. This book seeks to investigate whether groups of individuals with common interests will act according to those common interests or not. It has been thought that if individuals in groups are rational and self-interested, groups will act to further their interests because all individuals are better off if the collective objectives are achieved. However, Olson (1965) points out that rational and self-interested individuals will not act to achieve their common interests unless the number of individuals in a group is quite small or there is some special device to make individuals act in their common interests. The reason is that lobbying outcomes are a public good and all members of an interest group have common interests in obtaining it. However, individuals prefer to be free riders, who can enjoy the benefits of lobbying outcome without paying any money. Therefore, members in the group do not have mutual interests in sharing the costs of lobbying activities.

Olson uses the above idea to challenge group theory in political science. He shows that the incentive of interest groups to organize lobbying depends on the ability of the interest group to overcome free rider problems in collective political action. As a result, when the number of members in the group is

large, the organizational cost is large, and thus the likelihood of organizing a powerful interest group and of obtaining the collective good is reduced. In the same way, when the number of members in the group is small, it is easier to avoid the free rider problem, and therefore more influential lobbying activities can begin. That is to say, since relatively small interest groups will be able to organize and act in support of their common interests, and since large interest groups will not be able to do so, the outcome of the political influence among various interest groups in the policy-making process will not be symmetrical.

However, Pecorino (1998) show that the ability to receive protection through lobbying activities does not necessarily become more difficult as the number of firms in the industry rises. The cooperative outcome may be maintained in a repeated tariff lobbying game when a trigger strategy is used. Suppose that the payoff of each firm under the cooperative equilibrium is  $\pi^c$ . If a firm deviates from the cooperative equilibrium, the payoffs are assumed to be the sum of  $\pi^d$  for current period and  $\pi^n$  in all future periods with a discount factor  $\delta$ . As a result, if the payoff obtained from deviating cooperative lobbying is higher than the payoff from continued cooperation, the firm will defect and not undertake cooperative lobbying. The necessary condition for maintaining a cooperative lobbying outcome under a trigger strategy is  $\pi^d + \sum \delta^t \pi^n \leq \sum \delta^t \pi^c$ . Therefore, the effect of an increase in the number of firms in the industry on the difficulty of maintaining cooperative lobbying depends on the critical value of the discount parameter. If the discount parameter is higher than the critical value, then the cooperative equilibrium is supported. The industry can overcome free-rider problem even with an infinite number of firms. If the discount

parameter is below the critical value, then standard intuition holds. Perfect competition industry is unlikely to bring cooperative lobbying activities.

Long and Soubeyran (1996) also investigate the determinants of asymmetric lobbying from a heterogeneity point of view. Suppose that an interest group consists of domestic firms in an oligopolistic industry facing foreign competition from imports. The domestic firms are heterogeneous in the sense that they have different unit costs, and the variance of the distribution of the unit costs within the group is a measure of the group's heterogeneity. In the first stage, all domestic firms decide their own lobbying expenditures non-cooperatively. The government determines the tariff rate, which is influenced by the aggregate donations. Alternatively, all domestic firms can cooperate and decide together how much each must contribute in a Nash bargaining process. In the second stage, the domestic firms, knowing the tariff rate announced by the government, compete in outputs as Cournot rivals in the market. They find that the total lobbying expenditure depends on the degree of heterogeneity of the industry and on the shape of the demand curve, and that the large firms do not necessarily contribute more than smaller firms. If the demand elasticity is negative, the bigger firm spends more lobbying money, because a tariff increases the outputs of larger firms rather than those of smaller firms. Therefore, an increase in the degree of heterogeneity of the domestic firms may increase the total lobbying expenditure for tariff protection. That is to say, the degree of heterogeneity of a group has important implications for its total lobbying expenditure and hence its degree of success.

On the issue of competition among interest groups, Becker (1983, 1985) argues that actual political choices are determined by the efforts of groups to further their own interests, and that competition among interest groups for political influence determines the structure of protection. Assume that there are only two homogeneous interests groups in society, and that the levels of taxes and subsidies to each group are determined by an influence function that depends on the pressure exerted by both groups. Since a member of each group maximizes his utility by spending money on political activities to create pressure that affects his subsidies or taxes, these expenditures compete with each other for political influence. Since subsidies are financed by equivalent taxes, the increasing influence of one group decreases the influence of the other by the same amount. The equilibrium level of taxes and subsidies depends on the interaction between groups, and therefore a group that becomes more efficient at producing political pressure will be able to reduce its taxes or raise its subsidies. If both interests groups have equal political influence, and one group can gain more than another's loss, gainers will exert more political pressure than losers in order to implement the policy. Nevertheless, this analysis ignores two important questions: what are the determinants of a group's political influence? and what makes an interest group more powerful in organizing political activities?

## **(2) Asymmetric protection between declining and expanding industries**

In this section, we take declining and expanding industries as an example



to discuss why asymmetric protection occurs when both can spend on lobbying to raise profits via protection. Baldwin (1993) and Baldwin and Baldwin (1996) argue that expanding and contracting industries face asymmetric appropriability of the benefits of lobbying in the presence of sunk entry costs. Asymmetry arises because a marginal increase in protection will attract new entrants in an expanding industry, but not in a contracting one. If expanding industries lobby the government for support, there will be more entries than otherwise. These entries will continue until the benefits of lobbying equal the costs of lobbying, and therefore the rents will be dissipated by new entrants. That is to say, the policy-created rents attract new entries that erode the rents. The profits of the incumbent before and after lobbying are almost the same, and thus there is no incentive for the incumbent to do any lobbying. On the other hand, if declining industries undertake similar political activities, the results of lobbying can raise the profits back to the normal rate of return, and so no entrant will be attracted to share the rents of lobbying. Consequently, the problem of rent appropriability is more serious in expanding industries than in declining industries. Hence, we should observe more lobbying from declining industries than from expanding industries, and therefore more protection is obtained from governments for declining industries.

However, Grossman and Helpman (1996) follow Olson's idea and argue that it is the potential of free riding that discourages expanding industries from engaging in costly lobbying activities, regardless of whether the rents are dissipated by new entrants or not. Suppose that firms share donations and organize an interest group to lobby government. Nevertheless, once the

lobbying has taken place and the government has committed itself to a support policy, new firms enter the market. The new entrants cannot be forced to contribute to the lobbying costs, and thus they become free riders. Since entry will occur until the profits of entrants are zero, if the entry costs are zero, the incumbent will end up with negative profits which are equal to incumbent's lobbying contribution. Under such circumstances, the incumbent will not lobby in the first place because the lobbying costs are larger than the entry costs. That is why declining industries are more capable than expanding industries of overcoming the free-rider problem associated with interest group politics. When an industry is declining, the profits of existing firms are decreasing or even negative. This situation is unlikely to attract new entrants into the market who can free ride on the efforts of lobbying activities. In contrast, when an industry is expanding, the profits of existing firms are increasing. Therefore, there is an incentive for entrants to enter the market even without a government-supportive policy. As a consequence, new entrants are able to free ride on the results of the lobbying which is undertaken by others. Accordingly, if an expanding industry cannot prevent the free rider problem and force all new entrants to share the costs of lobbying equally, then lobbying activities may not achieve a political equilibrium.

The issue of the protection of a declining industry has been studied from other points of views besides lobbying. Dixit and Londregan (1996) consider why a government would compensate declining industries instead of encouraging the movement of resources to other more productive uses. They argue that the policy of redistributing income is determined on the basis of political

characteristics which are in general different from the economic characteristics rewarded by the market. Therefore, an economically inefficient way of transferring income is used. Suppose that there are two parties and voters split into a finite number of interest groups. The workers in the declining industry, who seeks to maximize their disposable income, are considering whether to move into another industry or not. Moving will bring higher incomes and staying will result in lower incomes. Nevertheless, each political party will propose a lump sum transfer of money in order to maximize its votes subject to budget constraint. Therefore, workers will look ahead to this political process of income distribution and then decide their occupational and voting decisions. If moving can yield a positive benefit, then workers will move, and this will lead to an economically efficient outcome. In other words, the political process offers an alternative. If the transfer policy can overcome income loss from staying in the declining industry, workers will stay and receive an economically inefficient compensation. Dixit and Londregan explain clearly the possibility for protection of a declining industry because workers can gain more compensation and total income due to the political characteristics. However, it is still unclear why it is the declining industry that has such favorable political characteristics, rather than the expanding industry.

To sum up, the determinants of lobbying and the structure of protection depend on the following factors. (1) How an interest group can overcome the free-rider problem. (2) The degree of heterogeneity of firms in the industry. (3) The competition between interest groups. Moreover, the asymmetric lobbying between expanding and declining industries relies on entry associated with rent

dissipation and free riding problems. Nevertheless, another important factor, the influence of external environments, is neglected in the literature. After an interest group is formed, which particular conditions influence the incentives to engage in various levels of lobbying activities? Further research can be done along these lines.

## **2.4 The Choice Among Alternative Policy Instruments**

As described in the previous section, politicians, interest groups and voters can influence policy outcomes in the policy-making process. However, there are many instruments which can be used for a specific policy purpose, protectionism for example, and any instrument can serve the purpose in principle. How is a specific policy selected among policy alternatives? In this section, we focus on two issues concerning policy selection: the choice between tariffs and income taxes, and the choice between tariffs and other trade policy instruments.

### **(1) Tariffs and income taxes**

Trade theory often states that introducing a tariff reduces a country's welfare in many circumstances. However, many countries do use tariffs as a protection policy in the early stage of economic development. Conybeare (1983) suggests that government revenue arguments can be used to explain this phenomenon. Taking the United States as an example, tariffs provided an average of more than 50 percent of government revenue from 1870 to 1914 (Baack and Ray, 1983). Prior to the Civil War, this ratio actually stood at 90 percent. After introducing income taxes in 1913, the average U.S. tariffs rate dropped

sharply and income taxes became the major source of United States government tax revenue.

In addition, Conybeare (1983) estimates the relationship between average tariff level and gross domestic product per capita for 35 countries. The coefficient of gross domestic product per capita is negative and significant, indicating that tariff protection declines with economic development. The average tariff level for developing countries is about 50 percent, and the average tariff level for developed countries is around 11 percent. Similar cross-country evidence, which supports the hypothesis that poor countries rely more heavily on trade taxes, is also provided by Rodrik (1995). A robust negative relationship exists between per capita income and the share of trade taxes in total tax revenue. An increase in per capita income of 1,000 dollar is associated with a reduction in 3.7 percent of the share of taxes that originates from international trade.

Grant and Kimbrough (1991) develop an optimal-revenue-raising tax programme model and show that relative collection costs play an important role in explaining how tax regimes vary with different levels of government spending. Consider a small open economy that is specialized in the production of a single good which is consumed and exported in order to finance the consumption of imported goods. Suppose that different collection costs are associated with each type of tax alternative. The representative consumer in the economy is assumed to maximize utility. The government is assumed to finance its spending using tariffs, excise taxes and income taxes as instruments so as to maximize the representative consumer's utility. The results suggest that the

tax rates, as well as the tax regime itself, depend on the ratio of government spending to national income. Collection costs introduce the possibility that an income tax regime will be adopted when the government spending-income ratio is sufficiently high. The benefits of avoiding more distorting taxes such as tariffs and exercise taxes are larger than the collection costs of income taxes. In other words, the use of tariffs is not an optimum tax policy unless they have an advantage over other types of taxes in terms of lower collection costs.

In addition, when the economy is developed, most countries would like to remove protection policy and to liberalize trade. Why, then, do tariffs remain? There are three explanations in the literature: policy persistence, uncertainty and piecemeal reform. First, once a protective tariff is established, special interests are established. It is quite possible that those who rely on protection will oppose the removal of these tariffs. Brainard and Verdier (1994) use a dynamic version of the Grossman and Helpman (1994) framework to show the possibility that high protection today is more likely to lead to high protection tomorrow.<sup>2</sup> In a two-period model, when demand shock causes a price decrease and thereby employment supply exceeds its demand, an industry can either make costly adjustment or lobby politicians for protection. The choice depends on the relative profitability of adjustment versus lobbying. In each of the two periods, industry first chooses its contribution in order to influence the tariff level; the politician then chooses tariffs in order to maximize

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<sup>2</sup>When an economic policy is introduced, agents will often respond by undertaking actions in order to benefit from it. These actions increase their willingness to pay for the policy in the future. This extra willingness to pay will be translated into political pressure to retain the policy, and this means the policy is more likely to be protective in the future. See Coated and Morris (1995).

a combination of social welfare and lobbying contributions; finally, the industry chooses the level of adjustment. Since protection reduces adjustment, current adjustment diminishes future lobbying intensity, and current protection raises future protection. In other words, the second period optimal adjustment is a decreasing function of the second period tariff. The second period tariff is a decreasing function of the first period adjustment. Accordingly, the latter is an increasing function of the first period tariff. In addition, the higher the domestic price and the larger the initial employment stock in the first period, the less the industry adjusts; and the lower the first-period adjustment, the more the industry lobbies in period two and the higher is the second period tariff.

Secondly, Fernandez and Rodrik (1991) provide a possible answer from the uncertainty point of view, although it is not directly related to the choice between tariffs and income taxes. Since the distribution of gains and losses from reform cannot be identified *ex ante* in the policy-making process, uncertainty can lead to unpopular *ex post* reform to be adopted *ex ante* even if the majority of the population would vote in favour the reforms in the absence of uncertainty. In other words, trade reform would be supported under complete certainty, but would be rejected under uncertainty, according to the distribution of gains and losses from reform.

Falvey and Lloyd (1991) also suggest that the choice of instruments of protection as well as the level of protection depend on the uncertainty characteristics of an industry in terms of any disturbances in its market. Consider a

competitive import-competing industry that provides an homogeneous product. The price of the foreign product is exogenous and depends on the state of nature. The price of the domestic product depends on both the distribution of the foreign price and the form and level of the protective instrument chosen. Suppose that the government selects a protective instrument for the industry so as to maximize a political support function. When the protective level is fixed, different instruments yield different distributions of the domestic price and household welfare for a given distribution of foreign price. Therefore, the selection of an optimal protective policy arise to choose the optimal domestic price in each state of nature. In an uncertain environment, households are not indifferent to the choice of instrument, because their ranking of instruments will differ according to their ownership of factors. Since different policies yield different outcomes in various environments, instruments that could provide higher levels of protection at lower world prices are preferred.

Thirdly, Falvey and Kim (1992) suggest that the government should consider the speed of liberation in trade reform. Should protection be removed immediately? Or should liberalization occur gradually? Falvey (1994) observes that a welfare-improving trade reform policy has been undertaken on a gradual basis rather than as one-shot affairs in many countries. Consider a perfectly competitive general equilibrium model of a small open economy producing and consuming  $n$  internationally tradeable goods. The only possible distorting policies are taxes and subsidies when the government intervenes in the economy. However, tariffs are an important tax source of government, and the potential revenue loss of conducting tariff reform should be consid-



ered as well. That is to say, trade liberalization, which cuts both import and export taxes, has a negative impact on the government budget. Restructuring the tax system to give it a broader base will take time, and government revenue also needs to be maintained. Therefore, both welfare-improving and revenue-enhancing should be considered when the government embarks upon trade reform. The results show that such a reform package exists when the compensated radical elasticities of all tariffs in the reform set are not equal.

To sum up, a government needs tax revenue to finance its budget. Since tariffs are easy to handle in terms of administrative and collection cost considerations, trade taxes are used when countries are still in the early economic development stage (Riezman and Slemrod, 1984). When the economy is more developed, the tariffs still remain but their importance declines. Perhaps protection persistence, uncertainty about the reform results and the speed of reform provide some explanations. Nevertheless, the existing explanations in the literature leave some important questions in political economy unanswered: First, why are tariffs politically acceptable as a source of tax revenue when countries are poor? Secondly, why does greater development lead countries to rely more on income taxes? Thirdly, what is the political economic relationship between different sources of tax revenue and economic development? A more fundamental answer to these questions from political economy needs to be provided.

## **(2) The choice between tariffs and other instruments**

In this sub-section, two issues related to the choice between tariffs and other

instruments are discussed. First of all, we consider the choice between tariffs and subsidies. It is quite often observed that a government prefers import tariffs instead of export subsidies. Rodrik (1995) argues that a government needs tax revenue to balance its budget, and a tariff policy which can raise revenue rather than a subsidy policy which loses revenue is preferred by the government. An alternative explanation in terms of lobbying activity is also provided by Rodrik (1986). Assume that an industry lobbies government for export subsidies and another industry lobbies for tariffs. There are some differences between these two policies: a subsidy policy is firm-specific, while an import tariff is industry-wide. Accordingly, the free rider problem associated with lobbying is more serious for the tariffs policy than the subsidies policy. An industry, therefore, will devote more resources to obtain protection through subsidies than through tariffs since the benefits of lobbying activities are entirely private. As a result, the welfare-maximizing government prefers a tariffs policy to a subsidy policy because the dead-weight loss caused by lobbying activities is lower.

Wilson (1990) provides a more elegant model which incorporates elections in order to discuss the choice between subsidies and tariffs. Suppose that two candidates compete to win office, and the probability of winning the election is a function of lobbying contributions. The politicians like to achieve power and therefore will make more protection transfers if the level of lobbying contributions is higher. However, trade protection policies will decrease social welfare. As a result, politicians may prefer to use a policy which produces higher social welfare. That is why politicians are reluctant to use subsidies, and a more in-

efficient income transfer policy like tariffs emerges as the political equilibrium. In addition, Grossman and Helpman (1994) show a similar result in the lobbying model. Since the effect of lobbying on policy outcome can be cancelled by competition between groups, lobbies may support government transfer income in a less efficient way and offer lower contributions. Interest groups will not necessarily prefer the government to use more efficient means of transferring income to them.

Secondly, we will turn to the choice between tariffs and non-tariffs restrictions such as voluntarily export restraints (VERs). In general, a tariffs policy extracts the profits of a foreign firm and is a source of government tax revenue. VERs, like import quotas which limit competitive imports and benefit domestic firms, give the rents from restrictions of trade to foreign firms. In the political economy of trade policy literature, Hillman and Usprung (1989) incorporate elections into the model, which considers the interests of both domestic and foreign firms in order to explain the governmental choice between tariffs and VERs. Suppose that the domestic and foreign firms compete in the domestic market and that two candidates campaign for an election. A two-stage game is used. At the first stage, each candidate makes trade policy announcements in order to maximize the probability of winning the election, knowing that the outcome is determined by campaign contributions. The protectionist candidate, who is supported by the domestic firms, seeks to maximize lobbying contribution, while the liberal candidate, who is supported by the foreign firms, also tries to maximize the lobbying contribution in order to win the election. At the second stage, each firm chooses outputs and expresses its political

support for a candidate via campaign contributions in order to maximize expected profits. Tariffs are divisive but VERs are consistent with candidates' policy positions, thus yielding mutual gains to both foreign firms and domestic firms. Therefore, no candidate will propose a tariffs policy if VERs are a policy option. However, a Cournot-quantity competition is assumed in this paper. In this case, the foreign profits of VERs, are therefore smaller than the profits of a free trade policy. VERs are involuntary. It is unreasonable for foreign firms to lobby and provide campaign money to a candidate for a less profitable policy. As a result, it might be a good idea to include a free trade policy and choose among free trade, tariffs and VERs policies

However, it is widely believed that tariff rates have come down due to international trade agreements, and that the use of a non-tariff barriers policy has increased. Perhaps non-tariff barriers are used to replace tariffs that are prohibited under W.T.O. treaties. Alternatively, Magee, Brock and Young (1990) point out that non-tariff protection may offer a political advantage over tariffs because its effects are less likely to be observed by those who bear the costs. VERs may fall into this category if voters who are hurt by protection are less able to associate their losses with the form of protection. Moreover, Falvey (1988) discusses the welfare implication of piecemeal policy reform, when both tariffs and quota are used in a small country. Consider two categories of goods: one subject to import tariffs, and the other subject to quantitative restrictions. When trade reform is undertaken, the welfare change of tariffs and quota policy can be calculated. The results show that no reform should be introduced if there are no distortions in the initial equilibrium. If the quota-

restricted goods are net substitutes for all other goods, piecemeal tariff reform reduction in all tariffs raises welfare. If all commodities are net substitutes, then a piecemeal quota reform will increase welfare. In addition, a process of piecemeal reform, which begins from quantitative distortions rather than tariffs, is less constrained.

In sum, the choice among policy instruments is an important and interesting question which needs more research from political economy point of view. In this section, we have briefly reviewed the literature on the choices between trade taxes and income taxes, between tariffs and subsidies, and between tariffs and VERs. In general, tariffs policy has been widely used to protect domestic industry in trade history, because it is an important resource for tax revenue in the early stage of economic development. When the economy is developed and more policy instruments are provided, tariffs policy might be no longer used for the purpose of protection. That is why non-tariffs barrier and more export-oriented trade policy are observed.

## 2.5 Conclusion

In the making of economic policy, the relationship between economics and politics is close. In practice, economic policies are decided through a political process. Politics unavoidably affects policy formulation, and an economic policy also changes the relative strengths of the different political actors influential in the process. In this chapter, three questions are highlighted. First, why does protection exist? In the politically economy literature, politicians, interest groups and voters are the three key politically active players in trade

policy formulation. Politicians will consider not only social welfare but also their political support when setting trade policy. Interest groups are willing to spend money in order to influence policy outcomes through lobbying activities. Voters can also express their support through voting. All actors pursue their own interests in the policy-making process. That is why protectionism is very likely to be selected. Secondly, why do different political actors, for example interest groups, have different impacts on policy outcomes? In general, both the formation of an interest group and the competition among these groups for political influence can determine the capacities for lobbying activities. Therefore, both the number of firms and the degree of heterogeneity of an interest are key factors in determining lobbying performance. Third, why does a specific policy emerge as a political equilibrium when many policy instruments are available? Since tariffs are an important source of tax revenues, which can be easily collected, many countries prefer tariffs in the early stage of economic development. Once a tariff is established, it is difficult to remove because of policy persistence, uncertainty and the necessarily piecemeal nature of reform. However, when more policy instruments are available, a government might switch to other alternatives.

# Chapter 3 The Lobby-Influence Model

## 3.1 Introduction

In most of the economic literature, policy is assumed to be made by an omnipotent, omniscient and benevolent government which seeks to maximize social welfare. However, since politics has a significant impact on economic policy outcomes, the assumption overlooks a crucial aspect of the policy-making process (Dixit, 1996). There is a big gap between what economists preach and what politicians do. This is particularly true in trade policy (Rodrik, 1995). As a result, many researchers incorporate politics through the general equilibrium framework of the Heckscher-Ohlin model or the specific factor model to explain why a government adopts protectionism rather than a free trade policy from the political economy of trade policy point of view ( Magee, 1994; Helpman, 1997; Riezman and Wilson, 1995; Rodrik, 1995). In these research, it is generally recognized that policy outcomes are influenced by the lobbying expenditure of interest groups in pursuit of their own interests. In other words, interest groups can influence the outcomes of the policy-making process and therefore lobbying activities need to be included in the analysis. Since interest groups can secure trade protection through lobbying, it is important to understand how policy outcomes are influenced by the lobbying expenditure of groups seeking to further their own interests. Game theory is a good ana-

lytical methodology that can be applied to analyze the influences of lobbying activity on trade policy and the impact of market condition on the incentives of engaging in lobbying.

A lobbying-influence model in a game theory setting is built in order to explain how trade policy is determined in the policy-making process when the domestic firms provide lobbying contributions in order to influence the outcomes. Suppose that one domestic firm and one foreign firm compete by providing outputs for a third market, and that the domestic firm uses lobbying contributions to influence export subsidies. A two-stage game is used. At the first stage, the firms can choose their lobbying expenditure, and then export subsidies are determined. At the second stage, both the domestic and foreign firms make their output decisions as Cournot duopolists. The equilibrium results can be calculated by using a subgame perfect equilibrium concept. In the trade theory literature, strategic trade policy has already used game theory as a framework to discuss the implications of trade policy. Brander and Spencer (1985) suggest that a welfare-maximizing government will set non-zero subsidies in a duopoly market so that social welfare can be increased through the profit-shifting. Since trade protection increases the profits of the domestic firm, it is quite natural that a self-interested firm will pursue the protection benefits even without the actions of a welfare-maximizing government. Baron (1997) recognizes that firms can use lobbying strategies to shape the competitive environment linking the interests of firms and policy so that its overall performance can be improved. As a result, an export subsidy can not only be set by a welfare-maximizing government but can also be obtained by domestic



firms through lobbying behaviour. It should be noted that the export subsidies are mainly determined by the self-interest firm in the lobbying-influence model but are decided by the welfare-maximizing government in the strategic trade policy model.

Several issues are raised by comparing the welfare-maximizing and lobbying-influence models. First, as the choice between a free trade policy and protectionism lies at the heart of the strategic trade policy literature, we must ask what is the policy implication in terms of social welfare and the profits of the domestic firm when the lobbying-influencing model is used. Since export subsidies can increase the outputs of the domestic firm, the results suggest that the profits of the domestic firm under the welfare-maximizing and lobbying-influence models are larger than those under the free trade policy. Therefore, the domestic firm always has an incentive to engage in lobbying activities in order to obtain export subsidies. However, lobbying activities are a kind of rent-seeking behaviour and therefore social welfare decreases. The social welfare under the welfare-maximizing and free trade models becomes higher than that under lobbying-influencing model. As a consequence, there might be a dilemma between the special interests of the domestic firm in terms of profits and the general interests in terms of social welfare considerations. When the export subsidies are determined by the level of lobbying contributions, protectionism may not be a good policy even in a duopoly market, as is suggested in the strategic trade policy literature. Free trade may still remain a good rule of thumb in its resistance of the pressure of special interest politics.

Secondly, since social welfare under the lobbying-influencing model is not always larger than that under the free trade policy, how can social welfare-decreasing lobbying activities be stopped? In general, there are two possible no-lobbying scenarios. On the demand side of trade policy, whether lobbyists will lobby or not depends on the benefits and costs of lobbying activities. If the costs are greater than the benefits, lobbyists will decide not to offer lobbying contributions. On the supply side of trade policy, if the government is unable to respond to the lobbying expenditure during policy formulation, there is no incentive for the domestic firm to engage in lobbying activities. In other words, the impact of lobbying behaviour on the level of protection depends on the response of the government. If the government cannot be influenced by any lobbying activities, the outcome of trade policy will not be biased. Therefore, it is important to know how the government responds in policy-making to the lobbying contributions when it is no longer assumed to act as a benevolent dictator seeking to maximize social welfare. In this chapter, the results suggest that the lobbying influence parameter is the necessary and sufficient condition that determines whether lobbying occurs.

Thirdly, how do market conditions influence the incentives of the domestic firm to engage in lobbying activities and therefore the obtained level of export subsidies? In the strategic trade policy literature, when the market demand is higher and the marginal costs of the domestic firm are lower, the government will set a higher export subsidy. In the lobbying-influencing model, the results of this chapter suggest that the domestic firm spends more money on lobbying activities when it faces higher market demand and when it is more cost

competitive. Therefore, the conditions for the domestic firm to obtain higher subsidies are the same as in the welfare-maximizing model.

The rest of the chapter is organized as follows. Section 3.2 describes the basic model of Brander and Spencer (1985), in which export subsidies are decided by a welfare-maximizing government. In section 3.3, a lobbying-influencing model is built for a duopolistic market. In order to obtain a higher profit, the domestic firm gains lobbying subsidies by offering lobbying contributions. In section 3.4, the differences in terms of export subsidies, domestic profits and social welfare between the welfare-maximizing and the lobbying-influence models are compared. The conclusions are presented in section 3.5.

## 3.2 The Welfare-Maximizing Model

The welfare-maximizing model is the same as the Brander and Spencer (1985) model of profit-shifting export subsidies.<sup>1</sup> In a Cournot duopoly model, one domestic and one foreign firm export a homogeneous product to a third country. The foreign firm has a constant marginal cost  $c$  and an exports output  $x_2$  to the third country. The domestic firm has a constant marginal cost  $c + t$  and export output  $x_1$  to the third country, where  $t$  represents cost competitiveness. In addition, the marginal costs of firms are assumed to be positive, i.e.  $c \geq 0$  and  $c + t \geq 0$ . If the marginal cost of the domestic firm is lower than that of the foreign firm, the domestic firm is cost competitive and the parameter  $t$  is negative. Similarly, if the marginal cost of the domestic firm is higher than that of the foreign firm, the domestic firm is less cost competitive

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<sup>1</sup>Collie (1993) uses a linear demand to discuss the Brander and Spencer model (1985), and his method is similar to that used in this section.

and the parameter  $t$  is positive.<sup>2</sup> Given these assumptions, the welfare of the country consists of the producer surplus from exports to the third country, i.e. the profits of its firm net of any export subsidy. The domestic government is assumed to maximize social welfare  $W_1$  in order to decide per unit export subsidies  $s_1$ . Similarly, the foreign government is assumed to maximize social welfare  $W_2$  in order to decide per unit export subsidies  $s_2$ . The market demand in the third country is assumed to be linear and segmented. The price of the product in the third country is given by the inverse linear demand function  $P = \alpha - \beta(x_1 + x_2)$   $\alpha, \beta > 0$ . Hence, the profits of the domestic firm and the foreign firm are expressed as follows:

$$\begin{aligned}\pi_1 &= (\alpha - \beta(x_1 + x_2) - c - t + s_1)x_1 \\ \pi_2 &= (\alpha - \beta(x_1 + x_2) - c + s_2)x_2\end{aligned}\tag{1}$$

At a Cournot equilibrium, the two firms independently and simultaneously choose their outputs to maximize profits, given the export subsidies set by the domestic government. Since demand is linear, there exists a unique Cournot equilibrium. Assuming that both firms export positive quantities to the third market, the first order conditions for a Cournot equilibrium are:

$$\partial\pi_1/\partial x_1 = -2\beta x_1 - \beta x_2 + \alpha - c - t + s_1 = 0$$

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<sup>2</sup>The cost competitiveness parameter  $t$  is used in order to stress the impact of cost difference between the domestic firm and the foreign firm on the equilibrium results. If the marginal costs of the domestic firm and the foreign firm are  $c_1$  and  $c_2$ , the cost competitiveness  $t$  is the cost difference between them  $c_1 - c_2$ . If  $c_1 \geq c_2$ , then  $t \geq 0$ . If  $c_1 \leq c_2$ , then  $t \leq 0$ . Moreover, the main findings for both settings are the same.

$$\partial\pi_2/\partial x_2 = -\beta x_1 - 2\beta x_2 + \alpha - c + s_2 = 0$$

These two equations can be solved to obtain explicit solutions for the outputs exported by the domestic and foreign firms:

$$\begin{aligned} x_1 &= \frac{\alpha - c - 2t + 2s_1 - s_2}{3\beta} \\ x_2 &= \frac{\alpha - c + t - s_1 + 2s_2}{3\beta} \end{aligned} \tag{2}$$

The welfare of the domestic country is given by the profits of the domestic firm net of any export subsidy it receives from the government. Therefore, the domestic welfare is given by  $W_1 = (\pi_1 - s_1 x_1) = (P - c - t)x_1$ . Similarly, the foreign welfare is  $W_2 = (\pi_2 - s_2 x_2) = (P - c)x_2$ . The welfare of both countries can be calculated as follows.

$$\begin{aligned} W_1 &= \frac{(\alpha - c - 2t + 2s_1 - s_2)(\alpha - c - 2t - s_1 - s_2)}{9\beta} \\ W_2 &= \frac{(\alpha - c + t - s_1 + 2s_2)(\alpha - c + t - s_1 - s_2)}{9\beta} \end{aligned} \tag{3}$$

In the following analysis, we will discuss three possible cases. The first is that of a free trade policy with neither the domestic government nor the foreign government offering any subsidies. In the second case, only the domestic government will subsidize the domestic firm. Thirdly, both the domestic government and the foreign government will subsidize their firms.

### Free trade policy

When both the governments adopt a free trade policy, the export subsidies are zero. Let the superscript  $f$  denote free trade. Then we can obtain the outputs of both the domestic firm  $x_1^f$  and the foreign firm  $x_2^f$  under a free trade policy from equation (2) as follows.

$$\begin{aligned}x_1^f &= \frac{\alpha - c - 2t}{3\beta} \\x_2^f &= \frac{\alpha - c + t}{3\beta}\end{aligned}\tag{4}$$

By using the outputs of both the foreign and domestic firms, the profits of the domestic firm  $\pi_1^f$  and the profits of the foreign firm  $\pi_2^f$  can be obtained:

$$\begin{aligned}\pi_1^f &= \frac{(\alpha - c - 2t)^2}{9\beta} \\ \pi_2^f &= \frac{(\alpha - c + t)^2}{9\beta}\end{aligned}\tag{5}$$

Similarly, the domestic welfare and the foreign welfare under free trade can also be calculated from equation (3) as follows:

$$\begin{aligned}W_1^f &= \frac{(\alpha - c - 2t)^2}{9\beta} \\ W_2^f &= \frac{(\alpha - c + t)^2}{9\beta}\end{aligned}\tag{6}$$

### Domestic export subsidy

Suppose that only the domestic government uses profit-shifting export subsidies to increase the outputs of its domestic firm while the foreign government adopts a free trade policy. Let the superscript  $u$  denote the case of domestic export subsidies. Therefore, the social welfare of the domestic country can be obtained from equation (3) as follows:

$$W_1^u = \frac{(\alpha - c - 2t + 2s_1^u)(\alpha - c - 2t - s_1^u)}{9\beta} \quad (7)$$

Differentiating the domestic welfare with export subsidy  $s_1^u$ , the first order condition is  $\partial W_1^u / \partial s_1^u = \frac{\alpha - c - 2t - 4s_1^u}{9\beta} = 0$ . The export subsidy can therefore be obtained as follows.

$$s_1^u = \frac{\alpha - c - 2t}{4} \quad (8)$$

In general, the export subsidies are higher if the domestic market demand is higher. In addition, the export subsidies are lower if the marginal costs of the foreign firm  $c$  and the cost competitiveness of the domestic firm  $t$  are higher. By substituting the export subsidy into equation (2), the optimal output of the domestic firm is  $x_1^u = \frac{\alpha - c - 2t}{2\beta}$  and the optimal output of the foreign firm is  $x_2^u = \frac{\alpha - c + 2t}{4\beta}$ . Similarly, the profits of both the domestic firm and the foreign firm can be obtained by substituting the optimal subsidy and the optimal outputs of both firms into equation (1).

$$\begin{aligned}\pi_1^u &= \frac{(\alpha - c - 2t)^2}{4\beta} \\ \pi_2^u &= \frac{(\alpha - c + 2t)^2}{16\beta}\end{aligned}\tag{9}$$

In addition, the social welfare of the domestic country and the foreign country can also be calculated as follows.

$$\begin{aligned}W_1^u &= \frac{(\alpha - c - 2t)^2}{8\beta} \\ W_2^u &= \frac{(\alpha - c + 2t)^2}{16\beta}\end{aligned}\tag{10}$$

Comparing the social welfare between equation (3) and equation (10), the social welfare of the domestic country is higher under a unilateral export subsidy than under a free trade policy, i.e.  $W_1^u > W_1^f$ . The welfare of the foreign country, however, is higher under a free trade policy than under a unilateral export subsidy, i.e.  $W_2^f > W_2^u$ .<sup>3</sup>

### Export subsidies for both countries

In this subsection, both the domestic government and the foreign government give subsidies to their firms. The two governments independently and simultaneously choose their export subsidies in order to maximize their social welfare. The superscript  $s$  denotes the export subsidies for the two countries. By maximizing equation (3), the first order conditions for a Nash equilibrium

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<sup>3</sup>These result are the same as in Brander and Spencer (1985) and Collie (1993).



are  $\partial W_1^s / \partial s_1^s = \frac{\alpha - c - 2t - 4s_1^s - s_2^s}{9\beta} = 0$  and  $\partial W_2^s / \partial s_2^s = \frac{\alpha - c + t - s_1^s - 4s_2^s}{9\beta} = 0$ . The optimal subsidy can be obtained by solving these two equations as follows:

$$\begin{aligned} s_1^s &= \frac{\alpha - c - 3t}{5} \\ s_2^s &= \frac{\alpha - c + 2t}{5} \end{aligned} \tag{11}$$

After obtaining the optimal subsidies, the outputs of both the domestic firm and the foreign firm can be calculated:

$$\begin{aligned} x_1^s &= \frac{2(\alpha - c - 3t)}{5\beta} \\ x_2^s &= \frac{2(\alpha - c + 2t)}{5\beta} \end{aligned} \tag{12}$$

Then, the profits of both the domestic and foreign firms can be derived as follows:

$$\begin{aligned} \pi_1^s &= \frac{4(\alpha - c - 3t)^2}{25\beta} \\ \pi_2^s &= \frac{4(\alpha - c + 2t)^2}{25\beta} \end{aligned} \tag{13}$$

The social welfare of both the domestic country and the foreign country can be obtained as:

$$\begin{aligned} W_1^s &= \frac{2(\alpha - c - 3t)^2}{25\beta} \\ W_2^s &= \frac{2(\alpha - c + 2t)^2}{25\beta} \end{aligned} \tag{14}$$

We can compare the social welfare between equation (3) and equation (14). The welfare of both countries is usually lower if both countries use export subsidies than if both countries adopt a free trade policy. That is to say, both countries are worse off under the Nash equilibrium than under a free trade policy.<sup>4</sup>

### 3.3 The Lobbying-influence Model

As pointed out in the previous section, export subsidies can increase the profits of the domestic firm in a duopoly market. Perhaps self-interested firms will try to act by themselves in order to obtain these protection benefits even if there is no welfare-maximizing government to set such a subsidy policy automatically. Since export subsidies are determined in the political policy-making process, these firms can engage in lobbying activities in order to obtain subsidies so that their profits can be increased. As a result, we focus on how a firm can influence policy outcomes through strategic lobbying activities in an export subsidy model.

A two-stage game is used. At the second stage, both the domestic and foreign firms compete in outputs as Cournot duopolists in the third market. At the first stage, the domestic firm decides its lobbying contributions in order

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<sup>4</sup>For the details, see also Collie (1993).

to get lobbying subsidies so that its profits are maximized. Suppose that the export subsidies  $s(l)$  are determined by lobbying contributions  $l$  offered by the domestic firm. In general, the higher the lobbying contributions  $l$ , the higher the export subsidies  $s$ . That is to say, the relationship between an export subsidy and a lobbying contribution is  $\frac{\partial s(l)}{\partial l} > 0$ . When the domestic firm spend more money on lobbying activity, the benefits from lobbying activity in terms of export subsidies should be increased. Otherwise, no firm would like to offer lobbying contribution. Moreover, the marginal return of lobbying activities is assumed to be decreasing. When the domestic firm spends more money on lobbying, the marginal export subsidy obtained by the domestic firm is decreasing, i.e.  $\frac{\partial^2 s(l)}{\partial l^2} < 0$ . In other words, when the domestic firm offers more lobbying contribution, the total export subsidies are higher but the increased level of subsidy become lower.<sup>5</sup> For simplicity, the export subsidies are assumed to take the functional form of  $s(l) = kl^{1/2}$ , where  $k$  is the lobbying influence parameter.<sup>6</sup> That is to say, the domestic firm is paying lobbying contribution  $l$  in order to lower its own costs by getting export subsidies  $kl^{1/2}$ . Note that the specific lobbying subsidy function satisfies the above generally required properties:  $\frac{\partial s(l)}{\partial l} = \frac{k}{2l^{1/2}} > 0$  and  $\frac{\partial^2 s(l)}{\partial l^2} = \frac{-k}{4l^{3/2}} < 0$ . Moreover, by using the specific function setting, we can compare the differences between the lobbying-influencing and welfare-maximizing models more easily.

Three cases of lobbying-influence model are discussed in this section. First

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<sup>5</sup>The same assumptions of the lobbying subsidies function  $s(l)$  are also made in Moore and Suranovic (1993); Long and Soubeyran (1996) and Pecorino (1998).

<sup>6</sup>If the lobbying subsidies function is assumed to be  $s(l) = kl$ , the equilibrium outputs of the domestic firm depend only on the lobbying-influencing parameter  $k$ , not on any market demand parameters  $\alpha$  and  $\beta$  in this model. That is,  $x_1^d = \frac{3}{4k}$ . Therefore, we only discuss the case of marginal returns to lobbying decreasing.

of all, there are no lobbying activities. In this case, the outputs and the profits of the domestic firm and the foreign firm are equal to those in the free trade policy. Domestic welfare and foreign welfare are also the same. Therefore, we do not repeat the calculations in this section. Secondly, only the domestic firm contributes lobbying money in order to gain a subsidy. Thirdly, both the domestic and the foreign firms offer lobbying contributions in order to obtain lobbying subsidies from their own governments.

### Domestic lobbying subsidy

Suppose that only the domestic firm engages in lobbying activities. Let the superscript  $d$  denote the case of a domestic lobbying subsidy. The domestic firm is assumed to spend lobbying contribution  $l_1$  and hence obtains subsidies  $s = k_1 l_1^{1/2}$ . Therefore, the profits of both the domestic and foreign firms are as follows:

$$\begin{aligned}\pi_1^d &= (\alpha - \beta(x_1^d + x_2^d) - c - t + k_1 l_1^{1/2})x_1^d - l_1 \\ \pi_2^d &= (\alpha - \beta(x_1^d + x_2^d) - c)x_2^d\end{aligned}\tag{15}$$

In order to obtain a subgame perfect equilibrium, we solve this game backwards. At the second stage, two firms independently and simultaneously choose their outputs to maximize their profits. Since demand is linear, there exists a unique Cournot-Nash equilibrium. Assuming that both firms export positive quantities to the third market, the first order conditions are as follows:

$$\partial \pi_1^d / \partial x_1^d = -2\beta x_1^d - \beta x_2^d + \alpha - c - t + k_1 l_1^{1/2} = 0$$

$$\partial\pi_2^d/\partial x_2^d = -\beta x_1^d - 2\beta x_2^d + \alpha - c = 0$$

Therefore, the outputs of the domestic firm and foreign firms can be obtained by solving the above two equations:

$$\begin{aligned} x_1^d &= \frac{(\alpha - c - 2t + 2k_1 l_1^{1/2})}{3\beta} \\ x_2^d &= \frac{(\alpha - c + t - k_1 l_1^{1/2})}{3\beta} \end{aligned} \quad (16)$$

By substituting the outputs of both the domestic and foreign firms into equation (15), the profits of the domestic firm can be calculated as follows:

$$\pi_1^d = \frac{(\alpha - c + 2k_1 l_1^{1/2} - 2t)^2}{9\beta} - l_1$$

At the first stage, the domestic firm chooses its lobbying contributions in order to maximize its profits. Maximizing the domestic profits with respect to lobbying contributions, the optimal lobbying contribution and the implied export subsidy are given as follows:

$$l_1 = \frac{4k_1^2(\alpha - c - 2t)^2}{(9\beta - 4k_1^2)^2} \quad (17)$$

$$s_1^d = k_1 l_1^{1/2} = \frac{2k_1^2(\alpha - c - 2t)}{9\beta - 4k_1^2} \quad (18)$$

Substituting equation (16) with the above lobbying contribution and export subsidies, the optimal outputs of both domestic and foreign firms are obtained as follows:

$$\begin{aligned}
x_1^d &= \frac{3(\alpha - c - 2t)}{9\beta - 4k_1^2} \\
x_2^d &= \frac{3\beta(\alpha - c + t) - 2k_1^2(\alpha - c)}{\beta(9\beta - 4k_1^2)}
\end{aligned} \tag{19}$$

Note that the lobbying-influence parameter is non-negative, i.e.  $k_1 \geq 0$ . When the lobbying-influence parameter  $k_1 = 0$ , the outputs of both the domestic and foreign firms in equation (19) are equal to the outputs under the free trade policy in equation (12). That is,  $x_1^d = \frac{\alpha - c - 2t}{3\beta} = x_1^f$  and  $x_2^d = \frac{\alpha - c + t}{3\beta} = x_2^f$ . Since the outputs of firms under the free trade policy is non-negative, we can ensure that  $\alpha - c - 2t \geq 0$ .

**Lemma 1:** *The positive outputs of the domestic firm and the foreign firm require  $0 \leq k_1 \leq \sqrt{\frac{3\beta(\alpha - c + t)}{2(\alpha - c)}}$ .*

**Proof:**

(1)  $x_1^d \geq 0$  requires that  $(\alpha - c - 2t) \geq 0$  and  $9\beta - 4k_1^2 \geq 0$ .

(2)  $x_2^d \geq 0$  requires that  $9\beta - 4k_1^2 \geq 0$  and  $3\beta(\alpha - c + t) - 2k_1^2(\alpha - c) \geq 0$ .

Since  $\alpha - c - 2t \geq 0$ , the conditions which satisfy the positive outputs are as follows.

$$\begin{aligned}
&x_i^d \geq 0, i = 1, 2 \\
&\Leftrightarrow 9\beta - 4k_1^2 \geq 0, 3\beta(\alpha - c + t) - 2k_1^2(\alpha - c) \geq 0 \\
&\Leftrightarrow 0 \leq k_1^2 \leq \frac{9\beta}{4}, 0 \leq k_1^2 \leq \frac{3\beta(\alpha - c + t)}{2(\alpha - c)} \\
&\Leftrightarrow 0 \leq k_1^2 \leq \frac{3\beta(\alpha - c + t)}{2(\alpha - c)} \leq \frac{9\beta}{4}
\end{aligned}$$

$$\Leftrightarrow 0 \leq k_1 \leq \sqrt{\frac{3\beta(\alpha - c + t)}{2(\alpha - c)}} \quad Q.E.D.$$

Note that the condition  $3\beta(\alpha - c + t) - 2k_1^2(\alpha - c) \geq 0$  is more likely to hold if  $k_1$  is smaller and the value of this expression is monotonic in  $k_1$ . Moreover, if both the domestic and foreign firms have the same marginal costs, the cost competitiveness  $t = 0$ . The above condition for positive outputs of the domestic and foreign firms reduces to  $0 \leq k_1 \leq \sqrt{\frac{3\beta}{2}}$ .

**Proposition 1:** *The lobbying contribution (lobbying subsidy) increases with the market demand and the lobbying influence parameter, and decreases with the marginal cost of the foreign firm and cost competitiveness. Moreover, the sufficient and necessary condition for the domestic firm not to spend any lobbying money is  $k_1 = 0$ .*

**Proof:**

The comparative statics of the optimal lobbying contribution  $l_1 = \frac{4k_1^2(\alpha - c - 2t)^2}{(9\beta - 4k_1^2)^2}$  are as follows:

$$\begin{aligned} \frac{\partial l_1}{\partial \alpha} &= \frac{(8k_1^2)(\alpha - c - 2t)}{(9\beta - 4k_1^2)^2} > 0 \\ \frac{\partial l_1}{\partial c} &= \frac{-(8k_1^2)(\alpha - c - 2t)}{(9\beta - 4k_1^2)^2} < 0 \\ \frac{\partial l_1}{\partial t} &= \frac{-(16k_1^2)(\alpha - c - 2t)}{(9\beta - 4k_1^2)^2} < 0 \\ \frac{\partial l_1}{\partial k_1} &= \frac{8k_1(9\beta + 4k_1^2)(\alpha - c - 2t)^2}{(9\beta - 4k_1^2)^3} > 0 \end{aligned}$$

Similarly, since  $s_1^d = k_1 l_1^{1/2}$ , we know that  $\text{sign}(\frac{\partial s}{\partial v}) = \text{sign}(\frac{\partial l}{\partial v})$  for an variable  $v$ .

If  $k_1 = 0$ , then  $l_1 = 0$ , so that  $k_1 = 0$  is the sufficient condition for no lobbying contribution. Since  $(\alpha - c + 2t) \neq 0$  and  $(9\beta - 4k_1^2) \neq 0$ , if  $l_1 = 0$ , then the necessary condition for no lobbying is  $k_1 = 0$ . Therefore, the sufficient and necessary condition for no lobbying contribution is that the lobbying influence parameter is zero. Q.E.D.

From proposition 1, the only case in which the domestic firm does not engage in lobbying activity is that the lobbying contribution does not have any impact on the outcome of the policy-making process. If the government can be influenced by lobbying contributions and therefore decides to set a lobbying subsidy, the optimal response for the domestic firm is to engage in lobbying activities so that its profits are maximized. Moreover, if the lobbying influence parameter is higher, the lobbying expenditure should also be higher. That is to say, the domestic firm would like to make a higher lobbying contribution if the domestic government can be influenced easily and therefore sets higher lobbying subsidies. Similarly, if the market demand is higher, the profits increased by subsidies are higher, so that more lobbying contributions are offered by the domestic firm. Moreover, when the domestic firm is more cost competitive, it can benefit more from subsidies because more profits are shifted from the foreign firm. In other words, if the domestic firm has higher marginal costs than those of the foreign firm, the domestic firm will spend less on lobbying activities. If the foreign firm has higher marginal costs than those of the domestic firm, the domestic will increase its lobbying expenditure in order to gain higher subsidies.



In addition, social welfare is equal to the profits of the firm net of any export subsidies. Therefore, the domestic welfare can be written as  $W_1^d = (\pi_1^d - k_1 l_1^{1/2} x_1^d) = (\alpha - \beta(x_1^d + x_2^d) - c - t)x_1^d$  and the foreign welfare is  $W_2^d = (\pi_2^d) = (\alpha - \beta(x_1^d + x_2^d) - c)x_2^d$ . The profits and social welfare of both the domestic and foreign firms can be obtained by substituting the lobbying contribution of equation (17) and the outputs of equation (19).

$$\begin{aligned}\pi_1^d &= \frac{(\alpha - c - 2t)^2}{9\beta - 4k_1^2} \\ \pi_2^d &= \frac{(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))^2}{\beta(9\beta - 4k_1^2)^2}\end{aligned}\tag{20}$$

$$\begin{aligned}W_1^d &= \frac{(9\beta - 10k_1^2)(\alpha - c - 2t)^2}{(9\beta - 4k_1^2)^2} \\ W_2^d &= \frac{(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))^2}{\beta(9\beta - 4k_1^2)^2}\end{aligned}\tag{21}$$

**Proposition 2:** *When the lobbying influence parameter is higher, the profits of the domestic firm are higher but the social welfare of the domestic country is lower. If  $k_1 = 0$ , the domestic profits are at the lowest level, and the social welfare is at its highest level.*

**Proof:**

Differentiating the profits of the domestic firm and the social welfare with respect to the lobbying influence parameter, we can obtain:

$$\partial\pi_1^d/\partial k_1 = \frac{8k_1(\alpha - c - 2t)^2}{(9\beta - 4k_1^2)^2} \geq 0$$

$$\partial W_1^d / \partial k_1 = \frac{-4k_1(9\beta + 20k_1^2)(\alpha - c - 2t)^2}{(9\beta - 4k_1^2)^3} \leq 0$$

Since  $0 \leq k_1 \leq \sqrt{\frac{3\beta(\alpha-c-t)}{2(\alpha-c)}}$ , the higher  $k_1$ , the higher  $\pi_1^d$  and the lower  $W_1^d$ .  
When  $k_1 = 0$ ,  $\pi_1^d = \frac{(\alpha-c-2t)^2}{9\beta}$  and  $W_1^d = \frac{(\alpha-c-2t)^2}{9\beta}$ . Q.E.D.

Proposition 2 shows that the profits of the domestic firm increase since it can use its lobbying contributions to gain lobbying subsidies, thus shifting the profits from the foreign firm to the domestic firm. The higher the lobbying influence parameter, the higher the lobbying subsidies and the greater the shifted profits. When the lobbying influence parameter  $k_1$  is zero, the domestic firm gets zero lobbying subsidies, so that its profits are the lowest. Furthermore, since lobbying costs are dead weight loss, the social welfare of the domestic country decreases. The higher the lobbying influence parameter, the greater the lobbying expenditure and the lower the social welfare. As a result, the export subsidies increase domestic profits through the profit-shifting effect but decrease social welfare because of the dead-weight loss. There is a dilemma when the domestic firm engages in lobbying activities. As a consequence, if the lobbying influence parameter is zero, no lobbying contribution will be offered and the social welfare is the highest. If the lobbying influence parameter is not zero, the domestic firm has an incentive to engage in lobbying activities so that its profits are higher but the social welfare is lower.

### Lobbying subsidies for both countries

Suppose that both the domestic and foreign firms would like to offer lobbying contributions in order to gain export subsidies. The superscript  $b$  denotes

export subsidies for both countries. The profits of the domestic and foreign firms are represented as follows:

$$\begin{aligned}\pi_1^b &= (\alpha - \beta(x_1^b + x_2^b) - c - t + k_1 l_1^{b1/2})x_1^b - l_1^b \\ \pi_2^b &= (\alpha - \beta(x_1^b + x_2^b) - c + k_2 l_2^{b1/2})x_2^b - l_2^b\end{aligned}\tag{22}$$

Maximizing the profits of the domestic and foreign firms, the first order conditions are as follows:

$$\begin{aligned}\partial\pi_1^b/\partial x_1^b &= -2\beta x_1^b - \beta x_2^b + \alpha - c - t + k_1 l_1^{b1/2} = 0 \\ \partial\pi_2^b/\partial x_2^b &= -\beta x_1^b - 2\beta x_2^b + \alpha - c + k_2 l_2^{b1/2} = 0\end{aligned}$$

Therefore, the outputs of the domestic firm and the foreign firm can be obtained by solving these two equations:

$$\begin{aligned}x_1^b &= \frac{(\alpha - c - 2t + 2k_1 l_1^{b1/2} - k_2 l_2^{b1/2})}{3\beta} \\ x_2^b &= \frac{(\alpha - c + t - k_1 l_1^{b1/2} + 2k_2 l_2^{b1/2})}{3\beta}\end{aligned}\tag{23}$$

At the first stage, the profits of the domestic and foreign firms, obtained by using equation (24), are maximized simultaneously. The optimal lobbying contribution and the optimal export subsidies are as follows:

$$\begin{aligned}
l_1^b &= \frac{4k_1^2(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))^2}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2} \\
l_2^b &= \frac{4k_2^2(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))^2}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2}
\end{aligned} \tag{24}$$

$$\begin{aligned}
s_1^b &= \frac{2k_1^2(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)} \\
s_2^b &= \frac{2k_2^2(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)}
\end{aligned} \tag{25}$$

The outputs of the domestic and foreign firms can be obtained by substituting the optimal lobbying contribution:

$$\begin{aligned}
x_1^b &= \frac{3(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)} \\
x_2^b &= \frac{3(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)}
\end{aligned} \tag{26}$$

**Lemma 2:** *The positive outputs of the domestic and foreign firms require*

$$0 \leq k_i \leq \sqrt{\frac{3\beta(\alpha - c + t)}{2(\alpha - c)}}, i = 1, 2.$$

**Proof:**

$$(1) x_1^b \geq 0 \text{ requires } 3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t) \geq 0 \text{ and } (27\beta^2 - 12\beta(k_1 + k_2) + 4k_1^2k_2^2) \geq 0.$$

$$(2) x_2^b \geq 0 \text{ requires } 3\beta(\alpha - c + t) - 2k_1^2(\alpha - c) \geq 0 \text{ and } (27\beta^2 - 12\beta(k_1 + k_2) + 4k_1^2k_2^2) \geq 0.$$

Therefore, the positive outputs of both firms require the following conditions.

$$\begin{aligned}
& x_i^d \geq 0, i = 1, 2 \\
& \Leftrightarrow (3\beta(\alpha - c + t) - 2k_i^2(\alpha - c)) \geq 0, i = 1, 2 \\
& \Leftrightarrow 0 \leq k_i \leq \sqrt{\frac{3\beta(\alpha - c + t)}{2(\alpha - c)}} \leq \sqrt{\frac{9\beta}{4}}, i = 1, 2 \quad Q.E.D.
\end{aligned}$$

Moreover, the profits of the domestic and foreign firms can be calculated by substituting equation (26) into (23) as follows:

$$\begin{aligned}
\pi_1^b &= \frac{(9\beta - 4k_1^2)(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))^2}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2} \\
\pi_2^b &= \frac{(9\beta - 4k_2^2)(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))^2}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2}
\end{aligned} \tag{27}$$

Similarly, the social welfare levels of the domestic and foreign countries are as follows:

$$\begin{aligned}
W_1^b &= \frac{(9\beta - 10k_1^2)(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))^2}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2} \\
W_2^b &= \frac{(9\beta - 10k_2^2)(3\beta(\alpha - c + t) - 2k_1^2(\alpha - c))^2}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2}
\end{aligned} \tag{28}$$

When the lobbying-influence parameter  $k_1 = k_2 = 0$ , the equilibrium results should be the same as those under the free trade policy. That is, the outputs of the domestic and foreign firms are  $x_1^b = \frac{(\alpha - c - 2t)}{3\beta} = x_1^f$  and  $x_2^b = \frac{(\alpha - c + t)}{3\beta} = x_2^f$ .

The profits of the domestic and foreign firms are  $\pi_1^b = \frac{(\alpha-c-2t)^2}{9\beta} = \pi_1^f$  and  $\pi_2^b = \frac{(\alpha-c+t)^2}{9\beta} = \pi_2^f$ . The welfare of the domestic and foreign countries are  $W_1^b = \frac{(\alpha-c-2t)^2}{9\beta} = W_1^f$  and  $W_2^b = \frac{(\alpha-c+t)^2}{9\beta} = W_2^f$ .

**Proposition 3:** *When the cost competitiveness parameter of the domestic firm is higher, the domestic lobbying contribution, the profits of the domestic firm, and the social welfare of the domestic country are lower.*

**Proof**

Differentiating equations (24), (27) and (28), the comparative statics of the lobbying contribution, the profits, and the social welfare with respect to cost competitiveness are as follows:

$$\begin{aligned}\frac{\partial l_1^b}{\partial t} &= -\frac{16k_1^2(3\beta - k_2^2)(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2} < 0 \\ \frac{\partial \pi_1^b}{\partial t} &= \frac{-4(3\beta - k_2^2)(9\beta - 4k_1^2)(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2} < 0 \\ \frac{\partial W_1^b}{\partial t} &= \frac{-4(3\beta - k_2^2)(9\beta - 10k_1^2)(3\beta(\alpha - c - 2t) - 2k_2^2(\alpha - c - t))}{(27\beta^2 - 12\beta(k_1^2 + k_2^2) + 4k_1^2k_2^2)^2} < 0 \quad Q.E.D.\end{aligned}$$

When the cost competitiveness parameter is higher, the marginal costs of the domestic firm are also higher and therefore the profit-shifting effect is lower. As a result, the incentive for the domestic firm to engage in lobbying activities is lower, so that the lobbying contribution offered by the domestic firm is also lower. Moreover, if the lobbying contribution is lower, the export subsidies obtained by the domestic firm are lower, so that the profits of the domestic firm are also lower. Since the profits of the domestic firm is part of the social welfare of the domestic country, the lower the domestic profits, the

lower the social welfare. In other words, the domestic firm will spend more money on lobbying activities if the domestic firm has lower marginal costs than those of the foreign firm. If the domestic firm is more cost competitive, the profit-shifting effect through export subsidy is stronger, and therefore the profits of the domestic firm and the social welfare of the domestic country are higher.

### 3.4 Comparison

In this section, we compare the results of applying the welfare-maximizing model and the lobbying-influencing model, in terms of the profits of the domestic firm, and the welfare of the domestic country. Two criteria are used. First of all, the equivalent export subsidies: when the welfare subsidies and the lobbying subsidies are the same, what is the ranking of social welfare and the profits of the domestic firm for the two models? Only the case in which the domestic firm alone is given subsidies is analyzed. If both the domestic and foreign firms are given subsidies, the conditions for both firms to obtain the same subsidies are different. Therefore, we do not discuss this case here. Secondly, the optimal export subsidies criteria: when the optimal export subsidies are calculated from the welfare-maximizing and lobbying-influencing models, what is the ranking of social welfare and the profits of the domestic firm?

#### Equivalent export subsidies

**Lemma 3:** *When the lobbying-influence parameter  $k_1 = \sqrt{\frac{3\beta}{4}}$ , the welfare subsidy  $s_1^u$  and the lobbying subsidy  $s_1^d$  are equivalent.*

**Proof:**

$$\begin{aligned}
s_1^u &= s_1^d \\
\Leftrightarrow \frac{2k_1^2(\alpha - c - 2t)}{9\beta - 4k_1^2} &= \frac{\alpha - c - 2t}{4} \\
\Leftrightarrow 12k_1^2(\alpha - c - 2t) &= 9\beta(\alpha - c - 2t) \\
\Leftrightarrow k_1^2 &= \frac{3\beta}{4} \\
\Leftrightarrow k_1 &= \sqrt{\frac{3\beta}{4}} \quad Q.E.D.
\end{aligned}$$

**Proposition 4:** *When the welfare subsidy is equal to the lobbying subsidy, the ranking of the profit of the domestic firm is best-worst: the welfare-maximizing model, the lobbying-influencing model and the free trade model.*

**Proof:**

When  $k_1 = \sqrt{\frac{3\beta}{4}}$ , the profits of the domestic firm are  $\pi_1^d = \frac{(\alpha - c - 2t)^2}{6\beta}$ . Therefore, the difference in the profits of the domestic firm among models is calculated as follows:

$$\begin{aligned}
\pi_1^u - \pi_1^d &= \frac{(\alpha - c - 2t)^2}{4\beta} - \frac{(\alpha - c - 2t)^2}{6\beta} \geq 0 \\
\pi_1^d - \pi_1^f &= \frac{(\alpha - c - 2t)^2}{6\beta} - \frac{(\alpha - c - 2t)^2}{9\beta} \geq 0
\end{aligned}$$

Therefore,  $\pi_1^u \geq \pi_1^d \geq \pi_1^f$ . Q.E.D.

Proposition 4 is quite intuitive. Since the export subsidies obtained by the domestic firm under both models are equal, the effect of profit-shifting is the same. However, the domestic firm has to spend a certain amount on lobbying



to get the lobbying subsidies. As a result, the profits of the domestic firm under the welfare-maximizing model are larger than those under the lobbying-influencing model. In addition, if the benefits of lobbying are not larger than the costs of lobbying, the domestic firm will not have any incentive to engage in lobbying activities. Therefore, the profits of the domestic firm under the lobbying-influencing model are higher than those under the free trade policy. Accordingly, the profits of the domestic firm under the welfare-maximizing model are the highest and the profits of the domestic firm under the free trade model are the lowest.

**Proposition 5:** *When the welfare subsidy is equal to the lobbying subsidy, the ranking of the social welfare of the domestic country is the best-worst: the welfare-maximizing model, the free trade model and the lobbying-influencing model.*

**Proof:**

When  $k_1 = \sqrt{\frac{3\beta}{4}}$ , the social welfare of the domestic country is  $W_1^d = \frac{(\alpha - c - 2t)^2}{24\beta}$ . Therefore, the differences in the social welfare of the domestic country among the models are calculated as follows:

$$\begin{aligned} W_1^u - W_1^d &= \frac{(\alpha - c - 2t)^2}{8\beta} - \frac{(\alpha - c - 2t)^2}{24\beta} \geq 0 \\ W_1^d - W_1^f &= \frac{(\alpha - c - 2t)^2}{24\beta} - \frac{(\alpha - c - 2t)^2}{9\beta} \leq 0 \\ W_1^u - W_1^f &= \frac{(\alpha - c - 2t)^2}{8\beta} - \frac{(\alpha - c - 2t)^2}{9\beta} \geq 0 \end{aligned}$$

Therefore,  $W_1^u \geq W_1^d \geq W_1^f$ . Q.E.D.

As pointed out by Brander and Spencer (1985), the welfare under the welfare-maximizing model is higher than that under the free trade policy because of the profit-shifting effect. Although profits-shifting effects exists in the lobbying-influencing model, the domestic firm has to offer lobbying contributions in order to obtain export subsidies. Lobbying expenditure is a dead weight loss. As a result, the social welfare of the domestic country under the lobbying-influencing model is lower than that under the free trade policy. Moreover, the export subsidies obtained by the domestic firm under the welfare-maximizing model and the lobbying-influencing model are equal. In this case, the effects of profit-shifting are the same but lobbying expenditure decreases social welfare. Therefore, the social welfare of the domestic country under the welfare-maximizing model is larger than that under the lobbying-influencing model. Accordingly, the social welfare of the domestic country under the welfare-maximizing model is the highest and the social welfare of the domestic country under the lobbying-influencing model is the lowest.

### The optimal export subsidies

**Proposition 6:** *When only the domestic firm can obtain export subsidies,  $s_1^u \geq s_1^d$  if  $3\beta - 4k_1^2 \geq 0$ .*

**Proof:**

The subsidy difference is calculated as follows:

$$\Delta s_1 = s_1^u - s_1^d = \frac{3(3\beta - 4k_1^2)(\alpha - c)}{4(9\beta - 4k_1^2)}$$

Therefore,  $\Delta s_1 \geq 0$  requires  $(3\beta - 4k_1^2) \geq 0$ . Q.E.D.

From proposition 6, when the export subsidy is given only to the domestic firm, a welfare subsidy is larger than a lobbying subsidy if  $3\beta - 4k^2 \geq 0$ . Otherwise, if  $3\beta - 4k^2 \leq 0$ , then the lobbying subsidy is higher than the welfare subsidy. Moreover, a welfare subsidy is more likely to be the larger if the value of the lobbying influence parameter is smaller. When the lobbying influence parameter  $k = 0$ , the subsidy difference is  $\Delta s_1 = \frac{\alpha - c}{4} > 0$ . In other words, when the government is easily influenced by the lobbying contribution, the lobbying subsidy is more likely to be larger than the welfare subsidy.

**Proposition 7:** *When the export subsidy is only given to the domestic firm, whether the profits of the domestic firm under the welfare-maximizing model are larger than that under lobbying-influencing model depends on the sign of  $5\beta - 4k^2$ . Moreover, the profits of the domestic firm under both the welfare-maximizing model and the lobbying-influence model are higher than those under the free trade model.*

**Proof:**

The differences in the profits of the domestic firm are as follows:

$$\begin{aligned}\pi_1^u - \pi_1^d &= \frac{(5\beta - 4k^2)(\alpha - c - 2t)^2}{4\beta(9\beta - 4k^2)} \\ \pi_1^u - \pi_1^f &= \frac{5(\alpha - c - 2t)^2}{36\beta} \geq 0 \\ \pi_1^d - \pi_1^f &= \frac{4k^2(\alpha - c - 2t)^2}{9\beta(9\beta - 4k^2)} \geq 0\end{aligned}$$

Therefore,  $(\pi_1^u - \pi_1^d) \geq 0$  requires  $5\beta - 4k^2 \geq 0$ . Q.E.D.

Although export subsidies can shift the profits of the domestic firm, the domestic firm has to engage in lobbying activities in order to obtain lobbying

subsidies. Therefore, the profits-shifting effect and the costs of lobbying activities drive the comparative results of the profits of the domestic firm among the models. It is quite clear that the domestic profits under the welfare-maximizing model would be larger than the profits of the domestic firm in the free trade case. Moreover, the domestic firm would like to engage in lobbying activities only if its profits increase so that the profits of the domestic firm under the lobbying-influencing model are higher than those under the free trade model. As a result, the profits of the domestic firm under the free trade policy are the lowest. Moreover, when the lobbying influence parameter is large enough and the lobbying subsidies are higher than the welfare subsidies, the profits under the lobbying-influencing model are likely to be higher than those under the welfare-maximizing model.

**Proposition 8:** *When only the domestic firm is given export subsidies, the ranking of the social welfare of the domestic country among models is the best-worst: the welfare-maximizing model, the free trade model and the lobbying-influence model.*

**Proof:**

The social welfare difference can be calculated as follows:

$$\begin{aligned}
W_1^u - W_1^d &= \frac{(9\beta^2 + 8\beta k^2 + 16k^4)(\alpha - c - 2t)^2}{8\beta(9\beta - 4k^2)^2} \geq 0 \\
W_1^u - W_1^f &= \frac{(\alpha - c - 2t)^2}{72\beta} \geq 0 \\
W_1^d - W_1^f &= \frac{-2k^2(9\beta + 8k^2)(\alpha - c - 2t)^2}{9\beta(9\beta - 4k^2)^2} \leq 0
\end{aligned}$$

Therefore,  $W_1^u \geq W_1^f \geq W_1^d$ . Q.E.D.

Export subsidies can increase the profits of the domestic firm through the profit-shifting effect. Since the profit of the domestic firm is part of the social welfare, the social welfare level under the welfare-maximizing model is greater than the social welfare level under a free trade policy. However, the domestic firm has to spend lobbying expenditure in order to get the lobbying subsidies and the lobbying contribution is a kind of dead weight loss. As a result, the social welfare under the welfare-maximizing model is larger than that under the lobbying-influencing model. Similarly, the social welfare under the free trade is also higher than those under the lobbying-influencing model. The social welfare of the domestic country under the lobbying-influencing model is the lowest.

To sum up, if the export subsidies are determined by the level of lobbying contribution, the profit of the domestic firm under the lobbying-influence model is higher than those of free trade policy. Therefore, the domestic firm always has an incentive to engage in lobbying activities in order to obtain lobbying subsidies. Unfortunately, the social welfare of the domestic country decreases when lobbying activities occur. Since lobbying expenditure is a kind of dead weight loss, the social welfare of the domestic country under the lobbying-influencing model is lower than those of free trade policy. As a result, there is a conflict between the special interests of the domestic firm in terms of profits and the general interests in terms of welfare. An export subsidy may not improve social welfare even in a duopoly market as is suggested in the strategic trade policy literature.<sup>7</sup> Free trade still remains a good rule of thumb as it

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<sup>7</sup>Moore and Suranovic (1993) also suggest that a subsidy is not a good policy if lobbying

resists the pressure of special interest politics in the full information situation.

### 3.5 Conclusion

In order to understand how lobbying activities can influence the outcome of trade policy-making, this chapter builds a political economy of trade policy model which incorporates lobbying in a duopoly market when information is complete. The results suggest that the lobbying subsidies are higher if the market demand is higher and the marginal cost of the domestic firm is lower. Moreover, the incentives of the domestic firm to engage in lobbying activities are greater if the lobbying influence parameter is higher. When the lobbying influence parameter is equal to zero, the lobbying subsidies are always zero, irrespective of the lobbying contribution offered by the domestic firm. Therefore, the domestic firm would not engage in any lobbying activity. However, if the lobbying influence parameter is not equal to zero, the domestic firm will undertake lobbying activities and thus increase its profits. In addition, the comparison between welfare-maximizing and lobbying-influencing models is made in order to appreciate the differences between them. Since export subsidies can shift the outputs of the domestic firm in a duopoly market, the profits of the domestic firm are higher under the export subsidies policy than those under the free trade policy. As a result, the domestic firm achieves the lowest profits if the free trade policy is adopted. The lobbying contribution is a kind of dead weight loss and therefore social welfare decreases. The ranking of social welfare of the domestic country among models is the best-worst: the welfare-maximizing model, free trade policy and the lobbying-influencing

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is incorporated.

model.

In addition, many export-oriented countries use a subsidy policy to help their firms compete in the international market. If the export subsidies are determined by the level of lobbying contribution, there are some testable hypothesis as follows. (1) The more efficient industries will lobby more in order to obtain higher export subsidies. (2) The industries have higher incentive to engage in lobbying activities if market demand is larger. (3) More lobbying contributions are offered by the industries if the lobbying influence parameter is higher. Nevertheless, when the domestic firm engages in lobbying activities, the social costs exceeds the social benefits of lobbying behaviour. Although lobbying subsidies increase the profits of the domestic firm, the social welfare of the domestic countries under lobbying subsidies is still lower than those under free trade policy in a duopoly market. Free trade rather than protectionism is a better policy from the view point of social welfare, in contrast to the results of Brander and Spencer (1985). Under these circumstances, a country should set a zero lobbying influence parameter so that the level of lobbying contribution does not have any impact on export subsidies. Thus, the welfare-decreasing lobbying activities can be stopped.

The lobbying-influencing model is built in a game theory framework and therefore is quite useful for analyzing the strategic role of behaviours and provides some useful insights. Although the specific lobbying subsidies functional form  $s(l) = kl^{1/2}$  is used, the function satisfies the general properties of  $\frac{\partial s}{\partial l} \geq 0$  and  $\frac{\partial^2 s}{\partial l^2} \leq 0$ . That is, a positive relationship exists between export

subsidies and lobbying contributions, and the export subsidies exhibits a decreasing return to the lobbying contribution. Under these circumstances, the sign of comparative statics of lobbying contribution is the same as the sign of comparative statics of export subsidies, irrespective of the special functional form. In addition, the special function has an advantage of bringing specific equilibrium results so that we can compare the difference between welfare-maximizing and lobbying-influence models. Nevertheless, the results obtained from the lobbying-influence model are sensitive to competition assumptions as those strategic trade policy models. In other words, if firms are assumed to compete as Bertrand rather than Cournot duopolists, the results are not robust. Moreover, the domestic government is quite passive in this model. That is to say, the model does not consider the supply side of trade policy and only uses the lobbying influence parameter to express the responses of the government. Since the lobbying influence parameter is determined by the political system, different political systems yield different lobbying-subsidies functions. More research specifying the political mechanisms, such as legislative organization, is required, combining both the supply side and demand side of trade policy in the policy-making process.



# Chapter 4 Signalling and Asymmetric Lobbying

## 4.1 Introduction

Since policy outcomes are influenced by the lobbying activities of interest groups in pursuit of their own interests, much work has focused on explanations of how organized interest groups can secure trade protection through lobbying activities (Brainard and Verdid, 1994; Findly and Wellisz, 1982; Grossman and Helpman, 1994; Moore and Suranovic, 1993; Rasmusen, 1993). However, the levels of protection obtained by each interest group are different. This gives rise to an important question: why do different interest groups have different impacts on policy outcomes? On the one hand, the formation of an interest group can influence its lobbying ability. Olson (1965) suggests that the number of firms is a key determinant of the organizational power of an interest group, because this affects the ability to overcome free rider problems. However, Pecorino (1998) argues that the ability to receive protection through lobbying activities does not necessarily become more difficult as the number of firms in the industry rises. At the same time, Long and Souberyran (1996) show that the degree of heterogeneity of an interest group is a key factor which determines lobbying performance. On the other hand, the competition among interest groups also influences the results of lobbying activities. Becker (1983,

1985) argues that the structure of protection obtained by each interest group is determined by the competition outcomes among interest groups for political influence. Nevertheless, the external environment, such as market demand and cost competitiveness, also has an impact on lobbying results, but this aspect is neglected in the literature. For example, when domestic firms face different levels of market demand or have different levels of international cost competitiveness, the incentives for the domestic firms to seek trade protection are different. In other words, as the external environment faced by interest groups varies, the incentive to engage in lobbying activities also varies so that the outcomes of lobbying activities are different. In this chapter, we focus on the issue of how asymmetric lobbying is determined by cost competitiveness in both complete and incomplete information structures.

Suppose that one foreign firm and one domestic firm export a homogenous product to a third country. Export subsidies, which are determined by the level of lobbying contribution, are adopted in order to help the domestic firm compete internationally. The actions of firms are assumed to follow two stages. In the first stage, the domestic firm chooses its lobbying expenditure and then the lobbying subsidies are obtained. In the second stage, both domestic and foreign firms compete in outputs as Cournot duopolists in the third market. In addition, we incorporate incomplete information of cost competitiveness into the model. Suppose that the cost competitiveness of the domestic firm has only two types: either high or low. This is private information to the domestic firm and is unknown to the foreign firm. However, it is common knowledge to both firms. If the domestic firm offers separate lobbying contribution according

to its true type of cost competitiveness, the private information of its cost competitiveness is therefore revealed. It is possible for the foreign firm to infer the type of cost competitiveness of the domestic firm by observing the levels of lobbying contribution in the first stage. Otherwise, if the domestic firm offers a uniform lobbying contribution, irrespective of the type of cost competitiveness, the private information of cost competitiveness remains still unknown to the foreign firm.

In the complete information case, the optimal lobbying contribution can be derived by using a subgame perfect equilibrium concept. The results suggest that the domestic firm spends more money on lobbying activities when the lobbying influence parameter of the domestic government is higher, when the demand of the third market is higher, and when the domestic firm is more cost competitive. In the incomplete information case, the results show that both separating and pooling equilibria can be found in the model but only separating equilibrium is self-enforcing. At the separating equilibrium, the domestic firm offers the full information lobbying contribution when its cost competitiveness is of the high type. When the cost competitiveness is of the low type, the domestic firm has to spend more on lobbying in order to signal its cost competitiveness to the foreign firm. Therefore, the profits of the domestic firm are lower than those in the full information case. To sum up, whether the information on cost competitiveness is complete or incomplete, the lobbying contributions offered by the domestic firm is determined by its level of cost competitiveness. In other words, the incentive of the domestic firm to engage in lobbying activities varies with its cost competitiveness. Different competitive

environments induce different incentives for the domestic firm to offer lobbying contribution. When export subsidies are determined by the level of lobbying contribution, the level of export subsidies obtained by the domestic firm varies because the level of cost competitiveness is different.

The remainder of this chapter is organized as follows. Section 4.2 sets out the basic framework when the domestic firm engages in lobbying activities in order to get export subsidies. Under the full information case, a subgame perfect equilibrium is used to solve the optimal lobbying contribution and outputs of both firms. Section 4.3 incorporates the incomplete information of cost competitiveness parameter into the model, and the existence and uniqueness of a separating equilibrium is discussed. In section 4.4, the domestic firm uses pooling equilibrium to decide its lobbying decision, and therefore the true information of cost competitiveness cannot be revealed. Both separating and pooling equilibrium are compared in order to determine the equilibrium choice of the domestic firm under condition of incomplete information. Brief concluding remarks appear in section 4.5.

## **4.2 The Basic Model**

Suppose that one foreign firm and one domestic firm export a homogeneous product to the third market. An export subsidy policy is used to help the domestic firm to compete in the international market. The level of export subsidy is determined by the amount of lobbying contribution offered by the domestic firm in the policy-making process. For simplicity, assume that the lobbying subsidy is determined by the lobbying contribution and takes the functional

form of  $s(l) = kl^{1/2}$ , where  $k$  is the lobbying influence parameter. A two-stage game is used. In the first lobbying stage, the domestic firm decides its optimal lobbying contribution in order to maximize its profits. Once the optimal lobbying contribution is determined, the lobbying subsidy is obtained. In the second output competition stage, both the domestic and foreign firms compete on outputs as Cournot duopolists in the third market. In addition, suppose that the marginal costs of the foreign firm are  $c$  and the marginal costs of the domestic firm are  $c + t$ , where  $t$  represents the cost competitiveness parameter. When incomplete information over the cost competitiveness parameter is incorporated into the model, only the domestic firm is assumed to have private information about its cost competitiveness. However, it is common knowledge that cost competitiveness parameter  $t_i$  has two types: either the high type  $t_h$  or the low type  $t_l$ , with probability  $Prob(t_i = t_h) = \lambda$ . If the cost competitiveness is of the high type, the domestic firm has higher marginal costs and is less cost competitive. If the cost competitiveness is of the low type, the domestic firm has lower marginal costs and is more cost competitive. Therefore, the profits of the domestic firm  $\pi_1(x_1, x_2)$  and the profits of the foreign firm  $\pi_2(x_1, x_2)$  can be written as follows:

$$\begin{aligned}\pi_1(x_1, x_2) &= (\alpha - \beta(x_1 + x_2) - c - t + kl^{1/2})x_1 - l \\ \pi_2(x_1, x_2) &= E[(\alpha - \beta(x_1 + x_2) - c)x_2 \mid l]\end{aligned}\tag{1}$$

At the second stage, both the domestic and foreign firms compete as Cournot duopolists. Let  $E(x_1 \mid l)$  be the conditional expectation of the foreign

firm concerning the outputs of the domestic firm  $x_1$ , given the level of lobbying contribution offered by the domestic firm. Maximizing the profits of both the domestic and foreign firms, the first order condition is obtained as follows:

$$\alpha - 2\beta x_1 - \beta x_2 - c - t + kl^{1/2} = 0$$

$$\alpha - 2\beta x_2 - \beta E(x_1 | l) - c = 0$$

Moreover, information concerning cost competitiveness is private to the domestic firm and therefore is unknown to the foreign firm. Suppose that the foreign firm uses the lobbying contribution which is observed at the first stage to infer the type of cost competitiveness. The foreign firm believes that the type of cost competitiveness is  $t_j = E(t | l)$ , which may or may not be consistent with the true type of cost competitiveness of the domestic firm  $t_i$ . Hence, the foreign firm can construct its expectation at the best reply of the domestic firm, i.e.  $E(x_1 | l) = \frac{(\alpha - \beta x_2 - c - t_j + kl^{1/2})}{2\beta}$ . Combining this and the first order condition of the foreign firm, the optimal outputs of both the domestic and foreign firms can be calculated as follows.

$$\begin{aligned} x_1(t_i, t_j) &= \frac{\alpha - c + 2kl^{1/2} - \frac{3t_i + t_j}{2}}{3\beta} \\ x_2(t_j) &= \frac{\alpha - c - kl^{1/2} + t_j}{3\beta} \end{aligned} \tag{2}$$

Substituting the outputs of both the domestic and foreign firms into equation (1), the profits of the domestic firm  $\pi_1(t_i, t_j)$ , which depend on both the

true type of cost competitiveness  $t_i$  and the foreign firm's beliefs about cost competitiveness  $t_j$ , are as follows:

$$\pi_1(t_i, t_j) = \frac{(\alpha - c + 2kl^{1/2} - \frac{3t_i + t_j}{2})^2}{9\beta} - l \quad (3)$$

Let lobbying contribution  $l(t_i, t_j)$  be the unique maximizer of  $\pi_1(t_i, t_j)$ . Therefore, the optimal lobbying contribution can be calculated by differentiating the profits of the domestic firm as follows:

$$l(t_i, t_j) = [\frac{2k(\alpha - c - \frac{3t_i + t_j}{2})}{9\beta - 4k^2}]^2 \quad (4)$$

### **Full information case**

In this subsection, the special case of full information of cost competitiveness is considered. Assume that the foreign firm knows the true type of cost competitiveness of the domestic firm. That is to say, when the cost competitiveness of the domestic firm is  $t_i$ , the foreign firm's belief about cost competitiveness is also  $t_i$ . As a result, the profits of the domestic firm can be obtained from equations (3) as follows:

$$\pi_1(t_i, t_i) = \frac{(\alpha - c - 2t_i + 2kl_f^{1/2})^2}{9\beta} - l_f \quad (5)$$

Similarly, the first best lobbying contribution can be obtained as follows:

$$l_f = [\frac{2k(\alpha - c - 2t_i)}{9\beta - 4k^2}]^2 \quad (6)$$

In fact, the optimal lobbying contribution under the full information case  $l_f$  is the same as equation (18) in chapter 3. If we differentiate the lobbying contribution according to the market demand, the lobbying influence parameter, and the cost competitiveness, the results of the comparative statics are the same as proposition 1 in chapter 3. When market demand and lobbying influence parameter are higher, the incentive for the domestic firm to engage in lobbying activities is greater, i.e.  $\partial l_f / \partial \alpha > 0$  and  $\partial l_f / \partial k > 0$ . However, the comparative statics of the lobbying contribution to the cost competitiveness parameter shows a negative relation, i.e.  $\partial l_f / \partial t_i < 0$ . When the cost competitiveness parameter  $t_i$  is larger, the marginal costs of the domestic firm are higher and therefore the level of lobbying contribution is lower. Similarly, when the cost competitiveness parameter  $t_i$  is smaller, the domestic firm has lower marginal costs and therefore the level of lobbying contribution is higher. As a result, when the information of cost competitiveness parameter is incomplete, it is very likely that the more cost competitive domestic firm has higher incentives to engage in lobbying activities in a separating equilibrium in order to signal its true type.

### 4.3 Signalling Equilibrium

In this section, separating equilibrium is discussed when the incomplete information over cost competitiveness is incorporated into the model. Suppose that the optimal lobbying contribution of the high type is  $l_h$  and the optimal lobbying contribution of the low type is  $l_l$ . The posterior belief of the foreign firm about cost competitiveness depends on the level of lobbying contribution.



That is,  $\text{prob}(t_j = t_h) = \lambda(l)$ . The existence of separating equilibrium requires the following conditions (Kreps and Wilson, 1982; Overgaard, 1993). First of all, the strategy of each type of domestic firm is sequentially rational at the separating equilibrium. The domestic firm chooses its optimal lobbying contribution according to its private information of cost competitiveness, given the beliefs of the foreign firm about cost competitiveness. Secondly, the foreign firm's belief about cost competitiveness are consistent at the separating equilibrium. Therefore, we can write the following three possibilities if the belief is consistent.

- (1) If  $l_h \neq l_l$ , then  $\lambda(l_h) = 1$  and  $\lambda(l_l) = 0$ . If the lobbying contributions of the high and low types are different, the foreign firm can form its belief according to the level of the optimal lobbying contribution offered by the domestic firm. When the optimal lobbying contribution is  $l_j$ , the foreign firm believes that the true type of cost competitiveness of the domestic firm is  $t_j$ .
- (2) If  $l_h = l_l$ , then  $\lambda(l_h) = \lambda$ . When the lobbying contribution for both the high and low types are the same, the posterior belief of the foreign firm about cost competitiveness is the same as prior belief  $\lambda$ .
- (3) If  $l \neq l_h, l_l$ , then any belief  $\lambda(l) \in [0, 1]$  is consistent. When the lobbying contributions are not separating equilibrium strategies, any belief about cost competitiveness is assured for the foreign firm.

Thirdly, weakly dominated strategies are eliminated. The foreign firm should rule out the possibilities that the domestic firm chooses a dominated

lobbying strategy. That is to say, if the lobbying contribution offered by the domestic firm is dominated for the low type but not for the high type, then the foreign firm believes that the cost competitiveness is high type. Conversely, if the lobbying contribution offered by the domestic firm is dominated only for the high type but not for the low type, then the foreign firm believes that the cost competitiveness is of the low type.

As a result, the separating equilibrium are  $l_h \neq l_l$  and  $\lambda(l_h) = 1, \lambda(l_l) = 0$ . In general, the higher the marginal costs of the domestic firm and the higher the cost competitiveness according to the foreign firm's belief, the lower the profits of the domestic firm. When information is incomplete, the domestic firm prefers to signal that its cost competitiveness is of the low type, no matter which type it actually is. Therefore, the domestic firm of the high type with marginal costs  $c + t_h$  is the worst type. When the cost competitiveness of the domestic firm is of the high type, and the foreign firm also believes the marginal costs of the domestic firm are of the high type, then the lobbying contribution  $l_h$  is the same as in the full information case:  $l_f$ . The profit  $\pi_1(l_f, t_h, t_h)$  is the highest. Any lobbying contribution  $l$  deviating from the full information lobbying contribution decreases profits. That is,  $\pi_1(l, t_h, t_h) < \pi_1(l_f, t_h, t_h), \quad \forall l \neq l_f$ . Moreover, the domestic firm of the low type with marginal costs  $c + t_l$  would like to offer a higher lobbying contribution  $l_l$ , which can signal to the foreign firm that its cost competitiveness is of the low type. Otherwise, if the lobbying contribution  $l \neq l_l$ , then the foreign firm would like to believe that the cost competitiveness of the domestic firm is of the high type.

### Incentive-compatibility conditions

Given the above beliefs, does  $(l_f, l_l)$  constitute a separating equilibrium? The results depend on whether incentive-compatibility conditions are satisfied or not. Suppose that the domestic firm is of the high type, if the foreign firm also believes that cost competitiveness is of the high type, then the profits of the domestic firm are denoted by  $\pi_1(t_h, t_h)$ . If the foreign firm believes that cost competitiveness is of the low type, then the profits of the domestic firm become  $\pi_1(t_h, t_l)$ . Similarly, when the domestic firm is of the low type, if the foreign firm also believes that the cost competitiveness is of the low type, then the domestic profits can be written as  $\pi_1(t_l, t_l)$ . If the foreign firm believes that cost competitiveness is of the high type, then the profits of the domestic firm are  $\pi_1(t_l, t_h)$ . As a result, the existence of a separating equilibrium requires that the following incentive-compatible conditions hold:  $\pi_1(t_i, t_i) \geq \pi_1(t_i, t_j)$ . In other words, if the cost competitiveness of the domestic firm is of the high type  $t_h$ , then the domestic firm would rather not contribute lobbying expenditure  $l_l$ , irrespective of how the foreign firm interprets this. If the cost competitiveness of the domestic firm is of the low type  $t_l$ , then the domestic firm would prefer to choose lobbying contribution  $l_l$  in order to persuade the foreign firm that the domestic firm is of the low type. That is,

$$\pi_1(t_h, t_h) - \pi_1(t_h, t_l) \geq 0$$

$$\pi_1(t_l, t_l) - \pi_1(t_l, t_h) \geq 0$$

- (1) The high type firm has no incentive to pretend to be of the low type.

It is unprofitable for the high type firm to pretend to be the low type instead of choosing its full information lobbying contribution  $l_f$  and be recognized. Let  $L^h$  be the set containing lobbying contributions which satisfy the incentive-compatible condition for the high type. That is,  $L^h = \{l | \pi_1(t_h, t_h) \geq \pi_1(t_h, t_l)\}$ . Even if the foreign firm believes that the cost competitiveness of the domestic firm is of the low type, the profits of the domestic firm of the high type are higher if it provides lobbying contribution  $l_f$ .

$$\begin{aligned}
\pi_1(t_h, t_h) &= \frac{(\alpha - c - 2t_h + 2kl_f^{1/2})^2}{9\beta} - l_f \\
&= \frac{(\alpha - c - 2t_h + \frac{(4k^2)(\alpha - c - 2t_h)}{9\beta - 4k^2})^2}{9\beta} - [\frac{2k(\alpha - c - 2t_h)}{9\beta - 4k^2}]^2 \\
&= \frac{(\alpha - c - 2t_h)^2}{9\beta - 4k^2} \\
&\geq \pi_1(t_h, t_l) = \frac{(\alpha - c + 2kl_l^{1/2} - \frac{3t_h + t_l}{2})^2}{9\beta} - l_l
\end{aligned}$$

(2) The low type has no incentive to deviate its equilibrium strategy.

It is unprofitable for the low type domestic firm to deviate its lobbying contribution  $l_l$  to the lobbying contribution  $l(t_l, t_h)$ , given that the foreign firm believes that cost competitiveness is of the high type. Let  $L^l$  be the set containing lobbying contributions which satisfy the incentive-compatible condition for the low type. That is,  $L^l = \{l | \pi_1(t_l, t_l) \geq \pi_1(t_l, t_h)\}$ . If the domestic firm of the low type is believed to be of the high type, the optimal lobbying contribution can be obtained by maximizing its profits  $\pi_1(t_l, t_h)$ . That is,  $l(t_l, t_h) = [\frac{2k(\alpha - c - \frac{t_h + 3t_l}{2})}{9\beta - 4k^2}]^2$ . The profits of the domestic firm of the low type

are higher if it abides by its lobbying strategy  $l_l$ , given the foreign firm's beliefs about the type of the cost competitiveness.

$$\begin{aligned}
\pi_1(t_l, t_l) &= \frac{(\alpha - c - 2t_l + 2kl_l^{1/2})^{1/2}}{9\beta} - l_l \\
&\geq \pi_1(t_l, t_h) = \frac{(\alpha - c + 2kl(t_l, t_h)^{1/2} - \frac{t_h + 3t_l}{2})^2}{9\beta} - l(t_l, t_h) \\
&= \frac{(\alpha - c - \frac{3t_l + t_h}{2})^2}{9\beta - 4k^2}
\end{aligned}$$

### Existence of separating equilibrium

When separating equilibrium exists, the equilibrium strategies are  $l_h = l_f$  and  $l_l \in L^h \cap L^l$ , and the equilibrium beliefs are  $\lambda(l_l) = 0$  and  $\lambda(l) = 1, \forall l \in R \setminus \{l_l\}$ . If the domestic firm chooses its lobbying contribution  $l_l$ , then the foreign firm believes that the domestic firm is of the low type. Otherwise, the foreign firm believes that the domestic firm is of the high type. In the following, we want to know whether the set  $L^h \cap L^l$  exists or not. In addition, if the set  $L^h \cap L^l$  is non-empty, is it possible to get a unique undominated separating equilibrium?

First of all, define function  $F(l) = \pi_1(t_h, t_l) - \pi_1(t_h, t_h) = [\frac{(\alpha - c - \xi_l + 2kl^{1/2})^2}{9\beta} - l] - \frac{(\alpha - c - 2t_h)^2}{9\beta - 4k^2}$ . When the incentive compatible condition for the high type is satisfied, the function  $F(l)$  is non-positive. Since the profits  $\pi_1(t_h, t_h)$  are fixed, the function  $F(l)$  has the highest value if the profits of the domestic firm  $\pi_1(t_h, t_l)$  are the lowest. As a result, the lobbying contribution can be calculated as  $l(t_h, t_l) = [\frac{2k(\alpha - c - \xi_l)}{9\beta - 4k^2}]^2$  and the value of the function  $F(l(t_h, t_l)) =$

$\frac{(\alpha-c-\xi_l)^2-(\alpha-c-2t_h)^2}{9\beta-4k^2} > 0$ . The lobbying contribution  $l(t_h, t_l)$  is not in the set of separating equilibrium for the high type  $L^h$ . If the equality holds such that  $F(l) = 0$ , the lobbying contribution can be solved as  $l_{F1}$  and  $l_{F2}$ . The set of lobbying contributions, which satisfy the incentive-compatible condition for the high type is  $L^h = \{l | l \leq l_{F1}; l \geq l_{F2}\}$ .

Secondly, define function  $G(l) = \pi_1(t_l, t_l) - \pi_1(t_l, t_h) = [\frac{(\alpha-c-2t_l+2kl^{1/2})^2}{9\beta} - l] - \frac{(\alpha-c-\xi_h)^2}{9\beta-4k^2}$ . When the incentive-compatible condition for the low type is satisfied, the function  $G(l)$  is non-negative. Since the profits of the domestic firm  $\pi_1(t_l, t_h)$  are fixed, the function  $G(l)$  has the highest value if the profits of the domestic firm  $\pi_1(t_l, t_l)$  are the highest. Therefore, we can calculate the lobbying contribution  $l(t_l, t_l) = [\frac{2k(\alpha-c-2t_l)}{9\beta-4k^2}]^2$  and the value of the function  $G(l(t_l, t_l)) = \frac{(\alpha-c-2t_l)^2-(\alpha-c-\xi_h)^2}{9\beta-4k^2} > 0$ . The lobbying contribution  $l(t_l, t_l)$  is at the set of separating equilibrium for the low type. If the equality holds such that  $G(l) = 0$ , the lobbying contribution can be solved as  $l_{G1}$  and  $l_{G2}$ . The set of lobbying contributions, which satisfy the incentive compatible-condition for the low type, is  $L^l = \{l | l_{G1} \leq l \leq l_{G2}\}$ .

As a result, the separating equilibrium strategies for the low type are lobbying contributions  $l$  satisfying  $F(l) \leq 0$  and  $G(l) \geq 0$ . That is,  $l \in L^h \cap L^l$ . The lobbying contribution  $l$  is in the set of  $\{l_{F2} \leq l \leq l_{G2}\}$ . Therefore, the least cost separating equilibrium for the low type can be found when lobbying contribution  $l_l = l_{F2}$ . As stated above, the lobbying contribution  $l_{F2}$  can be obtained by solving  $F(l) = [\frac{(\alpha-c-\xi_l+2kl^{1/2})^2}{9\beta} - l] - \frac{(\alpha-c-2t_h)^2}{9\beta-4k^2} = 0$ . That is, the lobbying contribution is  $l_{F2} = [\frac{2k(\alpha-c-\xi_l)+3\sqrt{(t_h-t_l)(\alpha-c-\frac{7t_h+t_l}{4})}}{9\beta-4k^2}]^2$ . When the domestic firm

is of the low type and the foreign firm believes that the cost competitiveness is of the low type, the profit of the domestic firm at the separating equilibrium is  $\pi_1(t_l, t_l) = \frac{(\alpha - c - 2t_l + 2kl_{F2}^{1/2})^2}{9\beta} - l_{F2}$

**Proposition 1:** *There exists a unique undominated separating equilibrium where  $l_h = l_f$  and  $l_l = l_{F2}$ .*

The lobbying contribution of the low type at the separating equilibrium is higher than that of full information so that signalling is costly and lobbying contribution distorted upwards. That is,  $l_{F2} > l(t_l, t_l)$ . As a result, the profit of the domestic firm under separating equilibrium is also lower than that under the full information case. In addition, the lobbying contribution  $l(t_l, t_l)$  is not in the set of incentive-compatibility conditions for the high type  $L^h$ , i.e.  $l(t_l, t_l) \notin L^h$ . Otherwise, there is no adverse selection and hence no signalling problems exists. That is to say, when the lobbying contribution is  $l(t_l, t_l)$ , the incentive-compatible condition of the high type does not hold as follows.

$$\begin{aligned}
& \pi_1(t_h, t_h) - \pi_1(t_h, t_l) \\
&= \frac{(\alpha - c - 2t_h)^2}{9\beta - 4k^2} - \frac{(\alpha - c - \xi_l + \frac{4k^2(\alpha - c - 2t_l)}{(9\beta - 4k^2)})^2}{9\beta} + [\frac{2k(\alpha - c - 2t_l)}{(9\beta - 4k^2)}]^2 \\
&= \frac{(\alpha - c - 2t_h)^2}{9\beta - 4k^2} - \frac{1}{9\beta} [\frac{3(t_l - t_h)}{2} + \frac{9\beta}{9\beta - 4k^2}(\alpha - c - 2t_l)]^2 + [\frac{2k(\alpha - c - 2t_l)}{9\beta - 4k^2}]^2 \\
&= \frac{(\alpha - c - 2t_h)^2}{9\beta - 4k^2} - \frac{(9\beta - 4k^2)(\alpha - c - 2t_l)^2}{(9\beta - 4k^2)^2} + \frac{3(\alpha - c - 2t_l)(t_l - t_h)}{9\beta - 4k^2} + \frac{(t_l - t_h)^2}{9\beta} \\
&= \frac{[(\alpha - c - 2t_h)^2 - (\alpha - c - 2t_l)^2 + 3(t_h - t_l)(\alpha - c - 2t_l)]}{9\beta - 4k^2} - \frac{(t_h - t_l)^2}{9\beta} \\
&= \frac{(t_h - t_l)(\alpha - c - 4t_h + 2t_l)}{4k^2 - 9\beta} - \frac{(t_h - t_l)^2}{9\beta} \leq 0
\end{aligned}$$

## 4.4 Pooling Equilibrium

For the game of incomplete information over cost competitiveness described in the previous section, the domestic firm of the low type has to spend more money on lobbying activities in order to convince the foreign firm that its cost competitiveness is low type. Hence, signalling through the level of lobbying contribution is costly. Under these circumstances, pooling equilibrium may be used to avoid separation. At the pooling equilibrium, the domestic firm decides to use a uniform lobbying contribution  $\bar{l}$  to lobby the domestic government, no matter which type it actually is. Therefore, the foreign firm still does not know the true type of the domestic firm since no information of cost competitiveness is revealed. The posterior belief of the foreign firm on cost competitiveness remains the same as the prior belief, i.e.,  $Pro(t_i = t_h) = \lambda(\bar{l}) = \lambda$ . The foreign firm takes the cost competitiveness of the domestic firm to be  $\bar{t} = \lambda t_h + (1 - \lambda)t_l$ . In addition, if the domestic firm is of the high type, the profit of the domestic firm at the pooling equilibrium is  $\pi_1(t_h, \bar{t})$ . If the domestic firm is of the low type, the profit of the domestic firm at the pooling equilibrium is  $\pi_1(t_l, \bar{t})$ .

### Incentive compatible conditions

Suppose that the pooling lobbying contribution is  $\bar{l}$ . If the lobbying contribution is different from the pooling equilibrium  $\bar{l}$ , the out of equilibrium belief is assumed to be that costs of the high type. In other words, when the cost competitiveness of the domestic firm is of the high type, the belief of the foreign firm is high type. When the cost competitiveness of the domestic firm is of the low type, the belief of the foreign firm should also be high type for con-



sistency. The existence of the pooling equilibrium requires that the following incentive-compatibility conditions hold.

(1) The high type prefers not to deviate pooling.

When cost competitiveness is of the high type, the profits of the domestic firm at the pooling equilibrium are higher than those at separating equilibrium. Let  $H^h$  be the set containing the lobbying contribution where the domestic firm of the high type prefers pooling equilibrium  $\bar{l}$  to lobbying contribution  $l$ . That is,  $H^h = \{l | \pi_1(t_h, \bar{t}) \geq \pi_1(t_h, t_h)\}$ .

$$\begin{aligned} \pi_1(t_h, \bar{t}) &\geq \pi_1(t_h, t_h) \\ \Leftrightarrow \frac{(\alpha - c + 2k\bar{l}^{1/2} - \frac{3t_h + \bar{t}}{2})^2}{9\beta} - \bar{l} \\ &\geq \frac{(\alpha - c + 2kl^{1/2} - \frac{3t_h + t_h}{2})^2}{9\beta} - l \end{aligned} \tag{7}$$

(2) The low type prefers not to deviate pooling.

When the cost competitiveness is of the low type, the profits of the domestic firm at the pooling equilibrium are higher than those at the separating equilibrium. Let  $H^l$  be the set containing lobbying contribution where the domestic firm of low type prefers pooling equilibrium  $\bar{l}$  to lobbying contribution  $l$ . That is,  $H^l = \{l | \pi_1(t_l, \bar{t}) \geq \pi_1(t_l, t_h)\}$ .

$$\begin{aligned} \pi_1(t_l, \bar{t}) &\geq \pi_1(t_l, t_h) \\ \Leftrightarrow \frac{(\alpha - c + 2k\bar{l}^{1/2} - \frac{3t_l + \bar{t}}{2})^2}{9\beta} - \bar{l} \\ &\geq \frac{(\alpha - c + 2kl^{1/2} - \frac{3t_l + t_h}{2})^2}{9\beta} - l \end{aligned} \tag{8}$$

When the pooling equilibrium exists, the equilibrium lobbying contribution must satisfy the condition:  $\bar{l} \in H^h \cap H^l$ .

**Proposition 2:** *Any lobbying contribution  $\bar{l} \in H^h \cap H^l$  can be sustained as an undominated pooling equilibrium.*

**Proof:**

The incentive compatible conditions are as follows.

$$\begin{aligned} \frac{(\alpha - c + 2k\bar{l}^{1/2} - \frac{3t_h + \bar{l}}{2})^2}{9\beta} - \bar{l} &\geq \frac{(\alpha - c + 2kl^{1/2} - \frac{3t_h + t_h}{2})^2}{9\beta} - l \\ \frac{(\alpha - c + 2k\bar{l}^{1/2} - \frac{3t_l + \bar{l}}{2})^2}{9\beta} - \bar{l} &\geq \frac{(\alpha - c + 2kl^{1/2} - \frac{3t_l + t_h}{2})^2}{9\beta} - l \end{aligned}$$

Since  $\bar{l} < t_h$ ,  $\frac{3t_i + \bar{l}}{2} < \frac{3t_i + t_h}{2}$ , where  $i = h, l$ . As a result, the above incentive compatible conditions can be satisfied if lobbying contribution  $\bar{l} = l + \delta$ , where  $\delta \approx 0$ . Therefore, the set  $\bar{l} \in H^h \cap H^l$  is not empty. Q.E.D.

Proposition 2 shows that there exists some pooling lobbying contribution  $\bar{l}$ , which satisfies the incentive-compatible conditions for both types. However, if the pooling equilibrium is refined, the above belief is shown inconsistent in the following subsection.

### Refinement of equilibrium

Following Cho and Kreps (1987), a self-enforcing equilibrium requires the elimination of equilibrium dominated strategies. That is, the domestic firm prefers a higher payoff in equilibrium.

**Proposition 3:** *No self-enforcing pooling equilibrium exists.*

**Proof:**

A potential candidate for a self-enforcing pooling lobbying contribution must be in the set of  $H^h \cap H^l$ . Fixing any pooling equilibrium  $\bar{l} \in H^h \cap H^l$ , we can find a lobbying contribution  $l^d = \bar{l} + \epsilon$ , where  $\epsilon \approx 0$  such that the following two conditions hold.

- (1) Since  $2t_l < \frac{3t_l + \bar{l}}{2}$ ,  $\frac{(\alpha - c - 2t_l + 2kl_d^{1/2})^2}{9\beta} - l_d \geq \frac{(\alpha - c - \frac{3t_l + \bar{l}}{2} + 2k\bar{l}^{1/2})^2}{9\beta} - \bar{l}$ .
- (2) Since  $2t_h > \frac{3t_h + \bar{l}}{2}$ ,  $\frac{(\alpha - c - 2t_h + 2kl_d^{1/2})^2}{9\beta} - l_d \leq \frac{(\alpha - c - \frac{3t_h + \bar{l}}{2} + 2k\bar{l}^{1/2})^2}{9\beta} - \bar{l}$ .

It is profitable for the low type to deviate from pooling equilibrium but not for the high type. Therefore, no self-enforcing pooling equilibrium exists. Q.E.D.

When the domestic firm offers lobbying contribution  $l^d$ , the profits of the domestic firm under the pooling contribution  $\bar{l}$  are lower than those under the lobbying contribution  $l^d$ . Therefore, the lobbying contribution  $l^d$  is a dominated strategy for the high type but not for the low type. Since the domestic firm can obtain higher profit if it deviates from the pooling equilibrium, the lobbying contribution  $l^d$  destabilizes the pooling equilibrium. As a result, the pooling equilibrium is not self-enforcing. In addition, when both the separating equilibrium and pooling equilibrium exist, the domestic firm would like to use the separating equilibrium rather than the pooling equilibrium. The separating equilibrium is the refined equilibrium and is adopted by the domestic firm.

## 4.5 Conclusion

This paper suggests that cost competitiveness can influence the incentives

of the domestic firm to engage in lobbying activities so that asymmetric lobbying is observed. When the information of cost competitiveness is complete, if the marginal costs of the domestic firm is higher, the domestic firm would offer a lower lobbying contribution and therefore export subsidies are lower. When the information of cost competitiveness is incomplete, both the separating equilibrium and pooling equilibrium can be found but only the separating equilibrium is self-enforcing. At the separating equilibrium, the belief of the foreign firm on the type of cost competitiveness is determined by the level of lobbying contribution offered by the domestic firm. When cost competitiveness is high type, the domestic firm offers full information lobbying contribution. When cost competitiveness is low type, the lobbying contribution is higher than the full information case in order to signal the foreign firm about its low type. As a result, the level of lobbying contribution offered by the domestic firm varies according to the level of its cost competitiveness in both complete and incomplete information cases. Since the incentives of the domestic firm to engage in lobbying activities vary with its cost competitiveness, the policy outcomes of lobbying are different.

The special lobbying subsidies function is also used in this chapter. When the information is incomplete, this setting can explain the strategic role of lobbying behaviour more easily by calculating specific equilibrium lobbying contributions. As pointed out in the previous chapter, the level of market demand and the lobbying influence parameter are also determinants of asymmetric lobbying in the full information case. If the information on these variables are incomplete, more research should be undertaken in order to get a complete

than if not. In the next chapter, we will discuss further the welfare effect of lobbying activities in a two-period model when potential foreign entry is considered.

# Chapter 5 Signalling, Free Entry and Asymmetric Lobbying

## 5.1 Introduction

It is generally recognized that lobbying activities are a kind of rent-seeking behaviour and lobbying expenditure is dead weight loss. Therefore, social welfare decreases if lobbying occurs (Krueger, 1974; Bhagwati, 1982). However, when information concerning the industry is incomplete, the informed firm can provide information about industry through lobbying in the policy-making process. As a consequence, social welfare might be increased (Austen-Smith, 1990; Lindblom and Woodhouse, 1994). There is a positive role for lobbying activities. In the public choice literature, Rasmusen (1993), Lohmann (1995) and Larserlof (1997) have investigated the welfare effect of lobbying behaviour in an incomplete information setting. However, their models do not discuss the possibility of potential entry. The actual or potential threat of foreign competition is important in the international market. As a result, we discuss the issue of positive role of lobbying activity in an incomplete information structure when the potential entry of the foreign firm is incorporated.

A two-period lobbying-influence model with entry is used. Suppose that one domestic monopoly firm and one potential foreign entrant are in the market.

In the first period, the domestic firm decides its optimal lobbying contribution and outputs. In the second period, the foreign firm makes its entry decision and then both the domestic and foreign firms choose their outputs. Assume that the entry decision of the foreign firm is based on its profits, which depend on the level of cost competitiveness of the domestic firm. In the full information case, when the cost competitiveness is of the high type, the foreign firm will enter the market because its profits are positive after entry. Both the domestic and foreign firms compete as Cournot duopolists in the market. When the cost competitiveness is of the low type, the foreign firm will stay outside the market because its profits are negative after entry. The domestic firm still remains as a monopoly. No mistake about entry decision can be made by the foreign firm when information is complete. The optimal lobbying contribution is zero for the domestic firm of both types.

However, when the information of cost competitiveness is incomplete and unknown to the foreign firm, it is possible that the foreign firm makes a wrong decision about entry. That is to say, when the cost competitiveness of the domestic firm is low type, the foreign firm enters the market and achieves negative profits; or when the cost competitiveness of the domestic firm is high type, the foreign firm stays outside the market and does not make any positive profits. Under this circumstances, the domestic firm can engage in lobbying activities so that the private information of cost competitiveness can be revealed to the foreign firm and helps the foreign firm to make right decision of entry.

Nevertheless, the domestic firm will not necessarily offer lobbying contribution according to its true type of cost competitiveness and might like to influence the belief of the foreign firm in order to deter entry. The results of this chapter suggest that both separating equilibrium and pooling equilibrium can be found. In the separating equilibrium, the incentive of the domestic firm to engage in lobbying is based on its cost competitiveness. The domestic firm will not provide any lobbying contribution when the cost competitiveness is of the high type; and will offer a positive amount of lobbying contribution when the cost competitiveness is of the low type. In the pooling equilibrium, the domestic firm will offer a zero lobbying contribution, which is the same as in the full information case. In addition, if the expected profits of the foreign firm after entry is negative, the pooling equilibrium is the refined equilibrium. Otherwise, the separating equilibrium is the refined equilibrium. However, social welfare under the pooling equilibrium is higher than that under the separating equilibrium. There is no positive role for lobbying activity when the potential foreign entry is incorporated, so lobbying activities should be banned.

The remainder of this paper is organized as follows. In section 5.2, a two period model with potential foreign entry is built under a complete information setting. Section 5.3 discusses the existence of separating equilibrium when the information over cost competitiveness is incomplete. The role of a lobbying contribution is like burning money to signal the true type of cost competitiveness of the domestic firm. Section 5.4 examines the existence of a pooling equilibrium. Since both the separating equilibrium and the pooling equilibrium can be found, the refinement of equilibrium and the comparison of social



welfare are analyzed. Brief concluding remarks appear in the final section 5.5.

## 5.2 The Basic Model Under Complete Information

Suppose that one domestic firm exports output to the third country and one foreign firm decides whether to enter the market or not.<sup>1</sup> A two-period lobbying-influence model is used. In the first period, the domestic firm chooses its optimal monopoly outputs. In the second period, the foreign firm decides whether to enter the market or not. If the foreign firm enters the market, both the domestic and foreign firms produce a homogeneous product and compete in terms of outputs as Cournot duopolists. If the foreign firm stays outside the market, the domestic firm remains a monopoly in the second period. Assume that the market demand is a linear function of total outputs  $X$  in the market, where  $P = \alpha - \beta X$   $\alpha, \beta > 0$ . In the first period, the total outputs  $X$  is the monopoly outputs of the domestic firm  $x_1^1$ . In the second period, the total outputs  $X$  is the sum of both outputs of the domestic firm  $x_1^2$  and the outputs of the foreign firm  $x_2^2$ . Note that the output  $x_2^2$  is zero if the foreign firm decides not to enter the market. In addition, assume that the marginal costs of the foreign firm are  $c$  and the cost of the foreign firm sunk to enter the market is  $F$ . The marginal costs of the domestic firm are  $c + t$ , where  $t$  represents the cost competitiveness. When the cost competitiveness parameter is positive, the marginal cost of the domestic firm are higher than that of the foreign firm and therefore it is less cost competitive. Similarly, when the cost competitiveness parameter is negative, the marginal costs of the domestic firm is lower than

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<sup>1</sup>In order to be consistent with the previous chapters, we assume that firms compete in the third market. However, the reasoning used in this chapter still hold if firms compete with each other in the domestic market.

that of the foreign firm and therefore is more cost competitive. As a result, the profits of the domestic firm in the first period  $\pi_1^1$  and the profits of the domestic and foreign firms in the second period  $\pi_1^2$  and  $\pi_2^2$  are as follows.

$$\pi_1^1(x_1^1) = (\alpha - \beta x_1^1 - c - t)x_1^1 \quad (1)$$

$$\pi_1^2(x_1^2, x_2^2) = (\alpha - \beta(x_1^2 + x_2^2) - c - t)x_1^2 \quad (2)$$

$$\pi_2^2(x_1^2, x_2^2) = (\alpha - \beta(x_1^2 + x_2^2) - c)x_2^2 - F$$

When the information over cost competitiveness is complete, the entry decision of the foreign firm is therefore based on its profits after entering the market, which depends on the type of cost competitiveness of the domestic firm. The profits of the foreign firm in the second period are always non-negative. No mistake about entry is possible. If the profits of the foreign firm after entry are positive, the foreign firm will enter the market. If the profits of the foreign firm after entry are negative, the foreign firm will stay outside the market.

### **The foreign firm enters the domestic market**

In the second period, if the foreign firm did enter the market, the outputs and profits of both firms can be calculated as follows. Maximizing the profits of both the domestic and foreign firms, the first order conditions are

$$-2\beta x_1^2 - \beta x_2^2 + \alpha - c - t = 0$$

$$-\beta x_1^2 - 2\beta x_2^2 + \alpha - c = 0$$

The above two equations can be solved simultaneously and the outputs of the domestic and foreign firms can be obtained as  $x_1^2 = \frac{\alpha - c - 2t}{3\beta}$  and  $x_2^2 = \frac{\alpha - c + t}{3\beta}$ . Substituting the outputs into equation (2), the profits of the domestic and foreign firms in the second period are derived as follows.

$$\begin{aligned}\pi_1^2 &= \frac{(\alpha - c - 2t)^2}{9\beta} \\ \pi_2^2 &= \frac{(\alpha - c + t)^2}{9\beta} - F\end{aligned}\tag{3}$$

**Lemma 1:** *The foreign firm will enter the market if and only if  $t \geq 3\sqrt{\beta F} - (\alpha - c)$ .*

**Proof:**

The foreign firm decides to enter the market if its profits are positive.

$$\begin{aligned}\pi_2^2 &= \frac{(\alpha - c + t)^2}{9\beta} - F \geq 0 \\ \Leftrightarrow (\alpha - c + t)^2 &\geq 9\beta F \\ \Leftrightarrow \alpha - c + t &\geq \sqrt{9\beta F} \\ \Leftrightarrow t &\geq 3\sqrt{\beta F} - (\alpha - c)\end{aligned}$$

That is,  $\pi_2^2 \geq 0 \Leftrightarrow t \geq 3\sqrt{\beta F} - (\alpha - c)$ . Q.E.D.

The foreign firm will enter the market if its profit is positive; and will stay outside the market if its profit is negative. In other words, if the cost competitiveness of the domestic firm satisfies the condition  $t \geq 3\sqrt{\beta F} - (\alpha - c)$ , the foreign firm will enter the market. The cost competitiveness is denoted as high type  $t_h$ . In this case, the domestic firm and the foreign firm compete with each other as Cournot duopoly in the market. The profits of the domestic and foreign firms in the second period are written as  $\pi_{1h}^2$  and  $\pi_{2h}^2$ . If the cost competitiveness of the domestic firm satisfies the condition  $t \leq 3\sqrt{\beta F} - (\alpha - c)$ , the foreign firm will stay outside the market. The cost competitiveness is denoted as low type  $t_l$ . In this case, the domestic firm remains a monopoly in the market. The profits of the domestic and foreign firms in the second period are written as  $\pi_{1l}^2$  and  $\pi_{2l}^2$ .

### **The foreign firm stays outside the market**

If the foreign firm stays outside the market, the outputs and profits of the foreign firm in the second period are zero. The outputs and profits of the domestic firm in the second period are the same as those of the domestic firm in the first period. As a result, we only need to calculate both outputs and profits of the domestic firm in the first period. Maximizing the profits of the domestic monopoly firm in the first period, the first order condition is  $\alpha - c - t - 2\beta x_1^1 = 0$ . The outputs of the domestic firm can be solved as  $x_1^1 = \frac{\alpha - c - t}{2\beta}$ . Substituting the outputs into equation (1), the profits of the domestic firm are as follows:

$$\begin{aligned}\pi_1^1 &= \frac{(\alpha - c - t)^2}{4\beta} \\ \pi_{1l}^2 &= \frac{(\alpha - c - t_l)^2}{4\beta}\end{aligned}\tag{4}$$

When information is incomplete, the profits of the domestic and foreign firms in both periods are summarized as follows.

(1) The first period profits

$$\pi_1^1 = \frac{(\alpha - c - t)^2}{4\beta}$$

(2) The second period profits

High cost competitiveness

$$\begin{aligned}\pi_{1h}^2 &= \frac{(\alpha - c - 2t_h)^2}{9\beta} \\ \pi_{2h}^2 &= \frac{(\alpha - c + t_h)^2}{9\beta} - F\end{aligned}$$

Low cost competitiveness

$$\begin{aligned}\pi_{1l}^2 &= \frac{(\alpha - c - t_l)^2}{4\beta} \\ \pi_{2l}^2 &= 0\end{aligned}$$

### 5.3 Separating Equilibrium

The incomplete information over cost competitiveness is incorporated into the model in this section. Assume that the information on cost competitiveness of the domestic firm is incomplete and is unknown to the foreign firm. Only the domestic firm has the private information on its cost competitiveness. However, it is a common knowledge that the cost competitiveness of the domestic firm has two types, either high type  $t_h$  or low type  $t_l$ , with probability  $\text{prob}(t = t_h) = \lambda$ . When the cost competitiveness is high type, if the foreign firm enters the market in the second period, the profit of the foreign firm is positive. When the cost competitiveness is of the low type, if the foreign firm enters the market in the second period, the profit of the foreign firm is negative. Irrespective of the type of cost competitiveness, if the foreign firm stays outside the market, the profit of the foreign firm are always zero. As a result, there is no guarantee that the profits of the foreign firms is non-negative. It is possible that the foreign firm makes a wrong decision about entry since the information on cost competitiveness is incomplete. In other words, when the cost competitiveness of the domestic firm is of the low type, the foreign firm enters the market and achieves negative profits; or when the cost competitiveness of the domestic firm is of the high type, the foreign firm stays outside the market and does not make any positive profits.

Under these circumstances, the domestic firm has an incentive to offer lobbying contribution  $l_j$ , which may not be consistent with its true type of cost competitiveness  $t_i$ , in order to influence the belief of the foreign firm and therefore deter entry. In other words, assume that the entry decision of the foreign firm depends on its belief about the cost competitiveness of

the domestic firm, and that the belief is influenced by the level of lobbying contribution offered by the domestic firm in the first period. Irrespective of the type of cost competitiveness of the domestic firm, the profits of the domestic firm are always higher if the foreign firm stays outside the market. It is clear that the domestic firm always prefers to be a monopoly rather than a duopoly in the second period. As a consequence, the domestic firm of both types has an incentive to engage in lobbying activities when information is incomplete. If the foreign firm believes that the cost competitiveness of the domestic firm is of the low type, entry is deterred and the profits of the domestic firm is increased. Therefore, the profit of both the domestic and foreign firms in both periods can be written as follows.

$$\pi_1^1(x_1^1, l_j) = (\alpha - \beta x_1^1 - c - t_i)x_1^1 - l_j \quad (5)$$

$$\begin{aligned} \pi_1^2(x_1^2, x_2^2) &= (\alpha - \beta(x_1^2 + x_2^2) - c - t_i)x_1^2 \\ \pi_2^2(x_1^2, x_2^2) &= \begin{cases} (\alpha - \beta(x_1^2 + x_2^2) - c)x_2^2 - F & \text{if enters market} \\ 0 & \text{if stays outside} \end{cases} \end{aligned} \quad (6)$$

It should be noted that the outputs of the domestic firm in the first period can also be used as a signal to reveal the private information on cost competitiveness to the uninformed foreign firm. However, there is no distortion in the product market if the lobbying contribution is used. Lobbying contribution is a better revealing mechanism than the outputs of the domestic firm. Therefore, lobbying contributions work as a signal to influence the belief

of the foreign firm about the type of cost competitiveness. In addition, since there is no foreign firm in the market in the first period, no profit-shifting subsidy is really obtained through lobbying activities. The role of lobbying contribution is analogous to burning money to signal its private information of the domestic firm. Moreover, following Milgram and Robert (1982)<sup>2</sup>, the foreign firm learns the true type of the cost competitiveness of the domestic firm immediately, after making its entry decision based on its belief.

Suppose that the monopoly profits of the domestic firm in the first period  $\pi_{1m}^1$  is equal to the profits of the domestic firm under full information case minus the lobbying contribution, i.e.  $\pi_{1m}^1 = \pi_1^1 - l_j$ . If the foreign firm believes that the cost competitiveness is low type and do not enter the market, the monopoly profits of the domestic firm in the second period is  $\pi_{1m}^2$ . If the foreign firm believes that the cost competitiveness is high type and enters the market, the duopoly profits of the domestic and foreign firms in the second period are  $\pi_{1d}^2$  and  $\pi_{2d}^2$ . According to the entry decision of the foreign firm, the profits of both the domestic and foreign firms can be calculated as those in the last section. We can summarize the profits of the domestic and foreign firms in both periods as follows.

(1) The first period profits

$$\pi_{1m}^1(t_i, l_j) = \frac{(\alpha - c - t_i)^2}{4\beta} - l_j$$

(2) The second period profits

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<sup>2</sup>See also in Tirole (1989), *The Theory of Industrial Organization*, P367-371.



The foreign firm enters the market

$$\begin{aligned}\pi_{1d}^2(t_i) &= \frac{(\alpha - c - 2t_i)^2}{9\beta} \\ \pi_{2d}^2(t_i) &= \frac{(\alpha - c + t_i)^2}{9\beta} - F\end{aligned}$$

The foreign firm stays outside the market

$$\begin{aligned}\pi_{1m}^2(t_i) &= \frac{(\alpha - c - t_i)^2}{4\beta} \\ \pi_{2m}^2(t_i) &= 0\end{aligned}$$

### Incentive compatibility conditions

As pointed out, the domestic firm can influence the belief and therefore the entry decision of the foreign firm by engaging in lobbying activities in order to increase its profits. Nevertheless, a rational foreign entrant, knowing that it is in the self interest of the domestic firm to lie about its true type of cost competitiveness, may not believe the revealed information. As a result, is it possible for the foreign firm to know the true type of cost competitiveness and to make the right entry decision according to the level of lobbying contribution offered by the domestic firm in the first period?

The incentive of the domestic firm to offer lobbying contribution varies with its cost competitiveness. The higher the cost competitiveness of the domestic firm, the lower the benefits of remaining a monopoly. As a consequence, the

domestic firm of high cost competitiveness is the worst type and has less incentive to engage in lobbying activities. When the cost competitiveness is of the high type, the domestic firm would like to choose a zero lobbying contribution, i.e.  $l_h = 0$ , which is the same as the full information case. When the zero lobbying contribution is observed, the foreign firm will believe that the cost competitiveness of the domestic firm is of the high type and will enter the domestic market. Any positive lobbying contribution deviating from the zero lobbying contribution only decreases the profits of the domestic firm of the high type. Similarly, when the cost competitiveness is of the low type, the domestic firm would like to offer a positive lobbying contribution  $l_l$ , which maximizes its profits. When lobbying contribution  $l_l$  is observed, the foreign firm would like to believe that the cost competitiveness of the domestic firm is of the low type and stays outside the market. Moreover, if lobbying contribution  $l \neq l_l$ , the cost competitiveness of the domestic firm is believed to be of the high type, and the foreign firm will enter the domestic market.

Given the above beliefs, does  $(l_h, l_l)$  constitute a separating equilibrium? The results depend on whether incentive compatibility conditions are satisfied or not. In other words, the domestic firm of low cost competitiveness does not want to pick the lobbying contribution of high type, and vice versa.

- (1) The high type has no incentive to pretend to be the low type.

When the cost competitiveness is of the high type, it is unprofitable for the domestic firm to offer lobbying contribution  $l_l$  relative to choose the full information lobbying contribution  $l_h = 0$  and be recognized.

Let  $L^h$  be the set of containing lobbying contributions which satisfy the incentive-compatibility condition for the high type. That is,  $L^h = \{l | \pi_{1m}^1(t_h, l_h) + \pi_{1d}^2(t_h) \geq \pi_{1m}^1(t_h, l_l) + \pi_{1m}^1(t_h)\}$ .

$$\begin{aligned}
& \pi_{1m}^1(t_h, l_h) + \pi_{1d}^2(t_h) \geq \pi_{1m}^1(t_h, l_l) + \pi_{1m}^1(t_h) \quad (7) \\
\Leftrightarrow & \frac{(\alpha - c - t_h)^2}{4\beta} - l_h + \frac{(\alpha - c - 2t_h)^2}{9\beta} \geq \frac{(\alpha - c - t_h)^2}{4\beta} - l_l + \frac{(\alpha - c - t_h)^2}{4\beta} \\
\Leftrightarrow & \frac{(\alpha - c - 2t_h)^2}{9\beta} \geq \frac{(\alpha - c - t_h)^2}{4\beta} - l_l
\end{aligned}$$

(2) The low type has no incentive to deviate from its equilibrium strategy.

When the cost competitiveness is of the low type, it is unprofitable for the domestic firm to deviate from its lobbying contribution  $l_l$  to the lobbying contribution  $l_h = 0$ , given that the foreign firm believes that the cost competitiveness is of the high type and therefore enters the market. Therefore, the domestic firm will abide by its lobbying contribution  $l_l$  if its true cost competitiveness is of the low type. Let  $L^l$  be the set containing lobbying contributions which satisfy the incentive-compatible condition for the low type. That is,  $L^l = \{l | \pi_{1m}^1(t_l, l_l) + \pi_{1m}^2(t_l) \geq \pi_{1m}^1(t_h, l_l) + \pi_{1d}^2(t_l)\}$ .

$$\begin{aligned}
& \pi_{1m}^1(t_l, l_l) + \pi_{1m}^2(t_l) \geq \pi_{1m}^1(t_h, l_l) + \pi_{1d}^2(t_l) \quad (8) \\
\Leftrightarrow & \frac{(\alpha - c - t_l)^2}{4\beta} - l_l + \frac{(\alpha - c - t_l)^2}{4\beta} \geq \frac{(\alpha - c - t_l)^2}{4\beta} - l_h + \frac{(\alpha - c - 2t_l)^2}{9\beta} \\
\Leftrightarrow & \frac{(\alpha - c - t_l)^2}{4\beta} - l_l \geq \frac{(\alpha - c - 2t_l)^2}{9\beta}
\end{aligned}$$

When the separating equilibrium exists, the equilibrium strategies are  $l_h = 0$  and  $l_l \in L^h \cap L^l$ , and the equilibrium beliefs are  $\lambda(l_l) = 0$  and  $\lambda(l) = 1, \forall l \notin R \setminus l_l$ . If the domestic firm chooses its lobbying contribution  $l_l$ , then the foreign firm believes that the cost competitiveness is of the low type. Otherwise, the foreign firm believes that the cost competitiveness is of the high type.

**Proposition 1:** *There exists a unique undominated separating equilibrium, where the strategies are  $l_h = 0$  and  $l_l = \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta}$  and the beliefs are  $\lambda(l_l) = 0$  and  $\lambda(l) = 1, \forall l \notin R \setminus l_l$ .*

**Proof:**

First, the set  $L^h \cap L^l$  is non-empty. Two incentive-compatible conditions can be rewritten as follows.

$$\begin{aligned} l_l &\geq \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta} \\ l_l &\leq \frac{(\alpha - c - t_l)^2}{4\beta} - \frac{(\alpha - c - 2t_l)^2}{9\beta} \end{aligned}$$

$L^h \cap L^l = \left\{ \frac{(\alpha - c - t_l)^2}{4\beta} - \frac{(\alpha - c - 2t_l)^2}{9\beta} \geq l_l \geq \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta} \right\}$ . Since  $\left[ \frac{(\alpha - c - t_l)^2}{4\beta} - \frac{(\alpha - c - 2t_l)^2}{9\beta} \right] - \left[ \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta} \right] = (t_h - t_l)(10\alpha - 10c - t_h - t_l) \geq 0$ , the set  $L^h \cap L^l$  is non-empty.

Secondly, a unique undominated separating equilibrium exists. In the separating equilibrium, the reasonable lobbying contributions are the least cost lobbying contributions. That is,  $l_h = 0$  and  $l_l = \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta}$  Q.E.D.

From proposition 1, there is a unique reasonable separating equilibrium. The domestic firm of the high cost competitiveness type offers zero lobbying

contribution  $l_h = 0$  and the foreign firm enters the domestic market. The domestic firm of the low cost competitiveness type offers a non-negative lobbying contribution  $l_l = \frac{(\alpha-c-t_h)^2}{4\beta} - \frac{(\alpha-c-2t_h)^2}{9\beta} \neq 0$  in order to signal its true type to the foreign firm. As a result, the foreign firm believes that the cost competitiveness is of the low type and stays outside the domestic market. That is to say, the domestic firm sacrifices its first-period profits to engage in lobbying activities and increases its second-period profits by remaining a monopoly.

## 5.4 Pooling Equilibrium

For the game of incomplete information described in the above section, the domestic firm would like to spend a positive amount of money  $l_l$  in order to convince the foreign firm that its cost competitiveness is of the low type. As a consequence, signalling through lobbying activities in the separating equilibrium is costly. Under these circumstances, the pooling equilibrium may be used for the domestic firm to avoid separation if the profits of the domestic firm in the pooling equilibrium are higher than the profits of the domestic firm in the separating equilibrium. In this section, we need to know whether a pooling equilibrium exists and, if so, whether it dominates the separating equilibrium or not.

### The existence of pooling equilibrium

Suppose that the domestic firm offers a uniform lobbying contribution  $\bar{l}$  in the pooling equilibrium, irrespective of the type of cost competitiveness. That is,  $\bar{l} = l_h = l_l$ . As a result, no information about the cost competitiveness is revealed and the foreign firm still remains uninformed. The belief of the

foreign firm is still  $prob(t_i = t_h) = \lambda(\bar{l}) = \lambda$ . In other words, the posterior and prior beliefs of cost competitiveness are the same. In addition, the existence of the pooling equilibrium requires that the expected payoff of the foreign firm is negative if the foreign firm enters the market, given the prior belief about cost competitiveness  $\lambda$ .<sup>3</sup> That is,

$$\begin{aligned} & \lambda\pi_2^2(t_h) + (1 - \lambda)\pi_2^2(t_l) < 0 \\ \Leftrightarrow & \lambda\left[\frac{(\alpha - c + t_h)^2}{9\beta}\right] + (1 - \lambda)\left[\frac{(\alpha - c + t_l)^2}{9\beta}\right] - F < 0 \end{aligned} \tag{9}$$

If the equation (9) is satisfied, there exists a pooling equilibrium. The domestic firm would like to offer a uniform lobbying contribution in the first period, and the entry of the foreign firm is deterred. An obvious candidate for pooling equilibrium, which does not depend upon the type of cost competitiveness  $t$ , is a zero lobbying contribution. That is to say, the domestic firm of both types chooses  $\bar{l} = 0$ , which is the same as the full information case. Out of equilibrium beliefs are cost competitiveness of high type. If a lobbying contribution  $l$  deviates  $\bar{l} = 0$ , the foreign firm will enter the market. The monopoly profits of the domestic firm are higher than the duopoly profits of the domestic firm minus the lobbying contribution. Therefore, the domestic firm of the high type will not spend any money on lobbying activities. Otherwise, foreign entry is induced and profit decreases. That is to say,  $\{l | \pi_{1m}^1(t_h, \bar{l}) + \pi_{1m}^2(t_h) \geq \pi_{1m}^1(t_h, l) + \pi_{1d}^2(t_h)\}$ .

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<sup>3</sup>See Milgram and Robert (1982) and Tirole (1989).

$$\begin{aligned} \pi_{1m}^1(t_h, \bar{l}) + \pi_{1m}^2(t_h) &\geq \pi_{1m}^1(t_h, l) + \pi_{1d}^2(t_h) \\ \Leftrightarrow \frac{(\alpha - c - t_h)^2}{4\beta} &\geq \frac{(\alpha - c - 2t_h)^2}{9\beta} - l \end{aligned} \quad (10)$$

If equation (9) does not hold, the expected profit of the foreign firm in the second period is strictly positive after entering the market. The entry of the foreign firm is not deterred in this case. As a result, the domestic firm of the low cost type has an incentive to signal its true cost competitiveness to the foreign firm in order to deter entry. For any fixed pooling equilibrium  $\bar{l}$ , there exists an out-of-equilibrium lobbying contribution  $l$  such that deviation increases the profits of the domestic firm of low type. The monopoly profits of the domestic firm minus the separating lobbying contribution are higher than the duopoly profits of the domestic firm minus the pooling lobbying contribution. That is to say,  $\{l | \pi_{1m}^1(t_l, l) + \pi_{1m}^2(t_l) \geq \pi_{1m}^1(t_h, \bar{l}) + \pi_{1d}^2(t_l)\}$ .

$$\begin{aligned} \pi_{1m}^1(t_l, l) + \pi_{1m}^2(t_l) &\geq \pi_{1m}^1(t_h, \bar{l}) + \pi_{1d}^2(t_l) \\ \Leftrightarrow \frac{(\alpha - c - t_l)^2}{4\beta} - l &\geq \frac{(\alpha - c - 2t_l)^2}{9\beta} \end{aligned} \quad (11)$$

Any lobbying contribution  $l$  satisfying  $l \leq \frac{(\alpha - c - t_l)^2}{4\beta} - \frac{(\alpha - c - 2t_l)^2}{9\beta}$  destabilizes the pooling equilibrium. No pooling equilibrium would be used by the domestic firm. Note that the lobbying contribution of the low type  $l_l = \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta} \leq \frac{(\alpha - c - t_l)^2}{4\beta} - \frac{(\alpha - c - 2t_l)^2}{9\beta}$ .

**Proposition 2:** *If equation (9) holds, the pooling lobbying contribution  $\bar{l} = 0$  for both types is the refined equilibrium. If equation (9) does not hold, the*

separating lobbying contributions  $l_h = 0$  for the high type and  $l_l = \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta} > 0$  for the low type are the refined equilibrium.

If the expected profits of entering the market are negative, the foreign firm would not enter the market. The domestic firm of both types offers a zero lobbying contribution so that its profits are the highest. In this case, the pooling equilibrium is the refined equilibrium. If the expected profits of entering the market are positive, the foreign firm will enter the market. Therefore, the domestic firm of the low cost competitiveness has an incentive to signal its true type to the uninformed foreign firm in order to deter entry. Under these circumstances, the domestic firm will offer lobbying contribution  $l_h = 0$  if its cost competitiveness is of the high type; and will offer lobbying contribution  $l_l > 0$  if its cost competitiveness is of the low type. The separating equilibrium is the refined equilibrium.

### The welfare comparison between two equilibria

Since the domestic firm exports outputs to the third country, the social welfare of the domestic country is equal to the profits of the domestic firm in this model.<sup>4</sup> Therefore, the social welfare of the domestic country under pooling equilibrium  $W_p$  is the expected profit of the domestic firm if entry is not allowed. That is, the domestic welfare is equal to the weighted sum of monopoly profits of the domestic firm of both types. Similarly, the social welfare under separating equilibrium  $W_s$  is the expected profits of the domestic firm when

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<sup>4</sup>If firms are assumed to compete in the domestic market, the social welfare contains not only the profits of the domestic firm but also the consumer surplus. The above analysis is the same and the following reasoning also holds for this case.



entry is allowed. That is, the weighted sum of the duopoly profits of the domestic firm of the high type and the monopoly profits of the domestic firm of the low type minus the lobbying contribution. If the social welfare under the separating equilibrium is higher than the social welfare under the pooling equilibrium, there is a positive role for lobbying in the incomplete information case. Otherwise, even if the private information can be revealed through lobbying activities, social welfare is still decreased. Under these circumstance, lobbying behaviour should be banned.

**Proposition 3:** *Social welfare under the pooling equilibrium is always higher than social welfare under the signalling equilibrium.*

**Proof:**

Since  $\bar{l} = 0$  and  $l_h = 0, l_l = \frac{(\alpha - c - t_h)^2}{4\beta} - \frac{(\alpha - c - 2t_h)^2}{9\beta}$ , social welfare for both equilibria is as follows:

$$\begin{aligned}
 W_s &= \lambda \left[ \frac{(\alpha - c - 2t_h)^2}{9\beta} - l_h \right] + (1 - \lambda) \left[ \frac{(\alpha - c - t_l)^2}{4\beta} - l_l \right] \\
 &= \frac{(\alpha - c - 2t_h)^2}{9\beta} + (1 - \lambda) \left[ \frac{(\alpha - c - t_l)^2}{4\beta} - \frac{(\alpha - c - t_h)^2}{4\beta} \right] \\
 W_p &= \lambda \frac{(\alpha - c - t_h)^2}{4\beta} + (1 - \lambda) \frac{(\alpha - c - t_l)^2}{4\beta}
 \end{aligned}$$

The social welfare difference can be calculated as follows:

$$W_s - W_p = \frac{(\alpha - c - 2t_h)^2}{9\beta} - \frac{(\alpha - c - t_h)^2}{4\beta} < 0$$

The social welfare  $W_s$  is always smaller than the social welfare  $W_p$ . Q.E.D.

Proposition 3 suggests that the benefits of lobbying activities are lower

than the costs of lobbying activities, so that social welfare under the pooling equilibrium is higher than social welfare under the separating equilibrium.

<sup>5</sup> Although lobbying activities can provide information when information is incomplete, signalling through lobbying contribution is costly. Lobbying activity should be banned in the case of incomplete information with the potential foreign entry.

## 5.5 Conclusion

This chapter investigates the issue of the positive role of lobbying activity when potential foreign entry is considered. Since lobbying is a kind of rent-seeking behaviour, lobbying expenditure decreases social welfare. However, there might be a positive role for lobbying if incomplete information is considered. But when we incorporate potential foreign entry into a two-period lobbying-influence model, the social welfare of the domestic country still decreases as in the complete information case. As a result, no positive role for lobbying is suggested. When the information of cost competitiveness is incomplete, the domestic firm has two choices in this model: either a separating lobbying contribution or a pooling lobbying contribution. If the expected profits of the foreign firm to enter the market are negative, the domestic firm of both types will offer a zero lobbying contribution in the pooling equilibrium. Otherwise, the domestic firm offers its lobbying contribution according to its cost competitiveness in the separating equilibrium. When cost competitiveness is of the low type, the domestic firm will offer a positive lobbying contribution

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<sup>5</sup>When firms compete in the domestic market, the social welfare difference between the separating equilibrium and pooling equilibrium is uncertain. That is,  $W_s - W_p = \frac{1+\lambda}{2} \left[ \frac{(\alpha-c-2t_h)^2}{9\beta} - \frac{(\alpha-c-t_h)^2}{4\beta} \right] + \frac{\lambda}{2} \left[ \frac{(\alpha-c+t_h)^2}{9\beta} + \frac{2(\alpha-c+t_h)(\alpha-c-2t_h)}{9\beta} \right]$ .

and the foreign firm will stay outside the market. When cost competitiveness is of the high type, the domestic firm will offer a zero lobbying contribution and the foreign firm will enter the market.

When the lobbying contribution is used as a information revelation mechanism, there is no distortion in the product market. Since no foreign firm is in the market in the first period, the role of lobbying contribution is purely like burning money to reveal its private information in this model. Although the foreign firm can make its entry decision according to the lobbying contribution offered by the domestic firm, signalling is costly. The benefits obtained by the lobbying activity are lower than the costs devoted to lobbying activity in this case. Social welfare under the pooling equilibrium is always higher than it is under the separating equilibrium. There is no positive role for lobbying with regard to social welfare. Although the benefits of lobbying always exist in the conditions of incomplete information, lobbying activities should not be encouraged. However, if firms compete in the domestic market instead of in the third market, social welfare includes not only the profits of the domestic firm but also the consumer surplus. In this case, although the profits of the domestic firm are higher under the pooling equilibrium than they are under the separating equilibrium, the consumer surplus is lower under the pooling equilibrium than it is under the separating equilibrium. As a result, social welfare under the separating equilibrium might be bigger than that under the pooling equilibrium. Lobbying activities may still have a positive role. That is to say, the result obtained in this chapter is not robust. However, the argument that lobbying increases social welfare under incomplete information does

not always hold as suggested in the literature. Since the result depends on the precise contents of social welfare in different models, future research can be conducted to see how different settings will affect the welfare effect of lobbying activities when information is incomplete.

# Chapter 6 Tariffs, Political Efficiency and the Median Voter

## 6.1 Introduction

It is generally recognized that income taxes are a more efficient tax instrument than trade taxes. However, tariffs are quite often used as an important source of tax revenue. Different taxation policy has been adopted by countries at different stages of economic development in tax history (Riezman and Wilson, 1995). Taking the United States as an example, tariffs provided on average more than 50 per cent of government revenue from 1879 to 1914. Prior to the Civil War, this ratio actually stood at 90 per cent. After income taxes were introduced in 1913, the average U.S. tariff rate dropped sharply and income taxes became the major source of United States government tax revenue (Baack and Ray, 1983). Moreover, Conybeare (1983) identified a negative relationship between average tariff levels and gross domestic product per capita for 35 countries. The average tariff level for developing countries was about 50 percent, and for developed countries was around 11 percent at that time. Rodrik (1995) also suggests that an increase in per capita income of 1,000 dollars is associated with a reduction of 3.7 percent in the share of trade taxes. In general, a robust negative relationship exists between per capita income and the share of trade taxes in total tax revenue. That is to say, tariffs are adopted

as a major source of tax revenue in a country's early stage of economic development whereas the importance of tariff revenue declines with income growth. When its economy is more developed, income taxes become the main source of tax revenue although tariffs still sometimes remain. These facts raise an interesting and important question: How to explain the taxation choice between income taxes and trade taxes for different levels of economic development?

Some explanations for the above issues are provided in the literature. Grant and Kimbrough (1991) develop an optimal tax raising programme model, in which relative collection costs play an important role in explaining the choice between tariffs and other forms of tax regimes. Since tariffs are easy to handle in terms of administrative considerations, trade taxes rather than income taxes are chosen in the beginning. When the benefits of avoiding more distorting trade taxes are larger than the collection costs of income taxes, it is very likely that the government will switch to income taxes. Recently, however, a new political economic literature has emerged, which emphasize the non-benevolent nature of a government. This explanation therefore seems incomplete. In addition, the tariff policy can be adopted in the early economic development for other reasons than collecting taxes, for example the infant industry protection argument. Brainard and Verider (1993) use a dynamic version of Grossman and Helpman (1993) to explain why tariffs are still used when the economy is developed. Once a protective tariff is established, it is difficult to remove because existing interests will fight against any movement away from tariffs as a primary revenue-raising device. Therefore, the government cannot easily switch to an alternative. In other words, tariff protection today is very likely

to be maintained tomorrow because of policy persistence. Nevertheless, this explanation remains incomplete. If we recognize that politically influential actors are involved, we must explain why tariffs are politically acceptable as a main source of tax revenue in the first place. Moreover, this reasoning should also explain why income taxes are adopted later on in economic development. That is to say, we must ask: Why are voters or interest groups content with trade taxes rather than income taxes when national income is low? And then, when the economy is developed, why might these politically influential actors switch their support to another tax instrument such as income taxes?

A political economy answer on the issue of the choice among taxation instruments for a democratic society is proposed. Suppose that politicians are self-interested and desire to stay in office; then this will lead them to enact those policies which satisfy the majority of voters. The median voter, who lies at the median of a distribution of voters' preferences on certain issues, represents the position of the majority of voters <sup>1</sup>. The government is assumed to propose two discrete taxation policy alternatives: trade taxes and income taxes. Each policy needs to raise enough tax revenue in order to balance a fixed budget target. Voters are assumed to support their own preferred tax policy. Therefore, the tax instrument which yields the highest utility for the median voter is preferred. In general, voters are happier if they pay less net taxes to the government. The results suggest that the choice of taxation instruments depends on the income level and income tax payments, which are determined

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<sup>1</sup>Enelow and Hinich (1984) prove that the median voter theorem holds if (1) the issue has a single dimension and (2) the preferences of each voter are single-peaked in that one dimension. For more details, see Mueller (1989).

by the tax method and income distribution. If the income tax of the median voter is higher than that of the pivotal voter, the trade tax policy is preferred. Otherwise, the income tax policy is supported. It is possible that a country chooses trade taxes in the early stage of economic development, and then switches to income taxes in the latter stage of economic development.

The remainder of this chapter is organized as follows. In section 6.2 we set out the basic majority voting framework when two discrete taxation policy alternatives are proposed. When preferences of all individuals are assumed to take the Gorman functional form, how individuals choose between trade taxes and income taxes is analyzed. Section 6.3 uses the Cobb-Douglas utility function as an example to discuss the impact of the structure of income taxes. The relationship between the choice of taxation method and the level of economic development is also discussed. Section 6.4 presents concluding remarks.

## 6.2 The Basic Model

Suppose that there are  $n$  individuals in the domestic country. Each individual is assumed to have income  $I_i$  and therefore the total income of the domestic country can be calculated as the sum of each individual's income, i.e.  $I = \sum_{i=1}^n I_i$ . The income probability distribution and the income cumulative distribution functions are  $f(I)$  and  $F(I)$  on the interval  $[0, \hat{I})$ .  $F(I)$  is the fraction of individuals with an income of less than  $I$  so that  $F(0) = 0$  and  $F(\hat{I}) = 1$ . Moreover, suppose that both a domestic product  $x$  and a foreign product  $y$  are consumed in the domestic market. The prices of the domestic and foreign products are  $P_x$  and  $P_y$ . Each individual is assumed to purchase



the amount of domestic product  $x_i$  and foreign product  $y_i$ . The total consumption of the domestic product is  $X = \sum_{i=1}^n x_i$  and the total consumption of the foreign product is  $Y = \sum_{i=1}^n y_i$ . Therefore, the individual's indirect utility function can be denoted as  $v_i(P_x, P_y, I_i)$ . Moreover, the most general indirect utility function of the Gorman form, which allows for aggregation in the sense of the representative individual model, is used for all individuals.<sup>2</sup>

$$v_i(P_x, P_y, I_i) = a_i(P_x, P_y) + b(P_x, P_y)I_i \quad (1)$$

In order to focus on the relationship between an individual's income and taxation choices, all individuals are assumed to have identical preferences. That is to say, the parameter  $a_i$  is the same for all individuals, i.e,  $a_i = a_j = a \quad \forall i, j$ . Moreover, assume that the marginal income utility  $b(P_x, P_y)$  is positive. The higher the level of an individual's income, the higher the level of the individual's utility. By Roy's identity, the demand functions for the domestic good  $x$  and foreign good  $y$  of consumer  $i$  will then take the form:

$$\begin{aligned} x_i(P_x, P_y, I_i) &= -\frac{\partial a(P_x, P_y)/\partial P_x}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_x}{b(P_x, P_y)} I_i \\ y_i(P_x, P_y, I_i) &= -\frac{\partial a(P_x, P_y)/\partial P_y}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_y}{b(P_x, P_y)} I_i \end{aligned} \quad (2)$$

The individual demand for both the domestic and foreign products depends on the individual's income level. When the level of an individual's income

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<sup>2</sup>See Varian (1991), Microeconomic analysis, P153-154.

increases, the individual's demand for the domestic and foreign products is higher. The aggregate demand for the domestic product  $X$  and the aggregate demand for the foreign product  $Y$ , which can be derived simply by adding the individual demand for each good, are as follows.

$$\begin{aligned} X(P_x, P_y, I) &= -n \frac{\partial a(P_x, P_y)/\partial P_x}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_x}{b(P_x, P_y)} I \\ Y(P_x, P_y, I) &= -n \frac{\partial a(P_x, P_y)/\partial P_y}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_y}{b(P_x, P_y)} I \end{aligned} \quad (3)$$

Similarly, the aggregate demand for both the domestic and foreign products depends on the aggregate income level. When the level of aggregate income increases, the aggregate demand for the domestic and foreign products is also higher.

In addition, the domestic government needs to raise a certain amount of tax revenue in order to finance its budget  $G$ . Suppose that only income taxes and trade taxes are available. When trade taxes are proposed, the domestic government imposes a specific tariff rate  $t$  on imports. The price of the foreign product becomes  $P_y + t$ . Since the budget is balanced by trade taxes, we can get  $G = tY(P_x, P_y + t, I)$ . As a consequence, the tariff rate is a function of income and the price of the domestic and foreign products, i.e.  $t = f(I, P_x, P_y)$ . As long as income and the price of the domestic and foreign products are fixed, the tariff rate is fixed. Aggregate utility and demand for both the domestic and foreign products can be calculated as follows.

$$\begin{aligned}
V(P_x, P_y + t, I) &= na(P_x, P_y + t) + b(P_x, P_y + t)I \\
X(P_x, P_y + t, I_i) &= -\frac{\partial a(P_x, P_y + t)/\partial P_x}{b(P_x, P_y + t)} - \frac{\partial b(P_x, P_y + t)/\partial P_x}{b(P_x, P_y + t)}I \\
Y(P_x, P_y + t, I) &= -\frac{\partial a(P_x, P_y + t)/\partial (P_y + t)}{b(P_x, P_y + t)} - \frac{\partial b(P_x, P_y + t)/\partial (P_y + t)}{b(P_x, P_y + t)}I
\end{aligned} \tag{4}$$

When income taxes are proposed, the level of income taxes  $T$  is equal to the government budget  $G$ . The price of the foreign product is still  $P_y$  and the disposable income is equal to the national income less income taxes, i.e.  $I - T$ . As a consequence, income taxes and trade taxes should be revenue equivalent so that  $G = T = tY(P_x, P_y + t, I)$ . Income taxes are a function of income, i.e.  $G = T(I) = \sum T_i(I_i)$ . As long as an income distribution is fixed, income taxes are fixed and individual's income taxes depend on the income tax schedule. The aggregate utility and demand for both the domestic and foreign products can be calculated as follows.

$$\begin{aligned}
V(P_x, P_y, I - T) &= na(P_x, P_y) + b(P_x, P_y)(I - T) \\
X(P_x, P_y, I - T) &= -\frac{\partial a(P_x, P_y)/\partial P_x}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_x}{b(P_x, P_y)}(I - T) \\
Y(P_x, P_y, I - T) &= -\frac{\partial a(P_x, P_y)/\partial P_y}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_y}{b(P_x, P_y)}(I - T)
\end{aligned} \tag{5}$$

It has been shown that income taxes are a more efficient taxation method than trade taxes (Varian, 1992; Dixit, 1985; Rodrik, 1995). A country is always worse off facing a tariff rate than an income tax that generates the same tax revenue. That is to say, if  $G = tY = T$ , then  $V(P_x, P_y, I - T) >$

$V(P_x, P_y + t, I)$ . In general, a country should collect a certain amount of taxes in order to balance its budget and therefore taxes are revenue equivalent. However, the efficiency of income taxes at the aggregate level need not carry over into the preferences of individual voters. This is because individual voters care about their own tax burden. If trade taxes and income taxes are not revenue equivalent, utility under trade taxes might be higher than utility under income taxes. As a result, if individuals can express their preference through majority voting, it is possible that majority voters will support trade taxes instead of more efficient income taxes.

### Majority Voting

In a democratic society, assume that a government proposes alternative taxation policy instruments and that individuals express their preferences through majority voting. Suppose that each individual has different preferences and will vote for the policy which yields the highest utility. If a taxation instrument is preferred by most people, the government will adopt this policy. Therefore, the alternative giving the highest utility to the majority of voters is supported. Majority voting is well defined since there are only two alternatives: trade taxes and income taxes. When trade taxes are proposed, there are no income taxes, but a specific tariff rate  $t$  is imposed. The individual's indirect utility and demand for both domestic and foreign products are as follows:

$$\begin{aligned} v_i(P_x, P_y + t, I_i) &= a(P_x, P_y + t) + b(P_x, P_y + t)I_i \\ x_i(P_x, P_y + t, I_i) &= -\frac{\partial a(P_x, P_y + t)/\partial P_x}{b(P_x, P_y + t)} - \frac{\partial b(P_x, P_y + t)/\partial P_x}{b(P_x, P_y + t)} I_i \end{aligned} \tag{6}$$

$$y_i(P_x, P_y + t, I_i) = -\frac{\partial a(P_x, P_y + t)/\partial(P_y + t)}{b(P_x, P_y + t)} - \frac{\partial b(P_x, P_y + t)/\partial(P_y + t)}{b(P_x, P_y + t)} I_i$$

Similarly, when income taxes are proposed, there are no trade taxes, but individual income taxes  $T_i$  are imposed. The individual's indirect utility and demand for both the domestic and foreign product are as follows:

$$\begin{aligned} v_i(P_x, P_y, I_i - T_i) &= a(P_x, P_y) + b(P_x, P_y)(I_i - T_i) \\ x_i(P_x, P_y, I_i - T_i) &= -\frac{\partial a(P_x, P_y)/\partial P_x}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_x}{b(P_x, P_y)}(I_i - T_i) \\ y_i(P_x, P_y, I_i - T_i) &= -\frac{\partial a(P_x, P_y)/\partial P_y}{b(P_x, P_y)} - \frac{\partial b(P_x, P_y)/\partial P_y}{b(P_x, P_y)}(I_i - T_i) \end{aligned} \quad (7)$$

In addition, suppose that the individual's income tax rate is  $\gamma_i = T_i/I_i$ . When progressive income taxes are used, if  $I_i < I_j$ , then  $\gamma_i \leq \gamma_j$ . When regressive income taxes are used, if  $I_i < I_j$ , then  $\gamma_i \geq \gamma_j$ . When uniform income taxes are used, the income tax rate is fixed, i.e.  $\gamma = \gamma_i = \gamma_j$ .

**Lemma 1:** If  $I_i \geq I_j$  and  $\gamma_i$  satisfies  $(1 - \gamma_i) \geq (1 - \gamma_j) \frac{I_j}{I_i}$ , then  $I_i - T_i \geq I_j^* - T_j^*$ .

**Proof:**

If  $I_i \geq I_j$ , then

$$\begin{aligned} I_i - T_i &\geq I_j - T_j \\ \Leftrightarrow (1 - \gamma_i)I_i &\geq (1 - \gamma_j)I_j \\ \Leftrightarrow (1 - \gamma_i) &\geq (1 - \gamma_j) \frac{I_j}{I_i} \text{ Q.E.D.} \end{aligned}$$

Lemma 1 ensures that the pre-tax and after-tax ordering of individuals by income remains the same. In other words, if  $I_i \geq I_j$  then  $I_i - T_i \geq I_j - T_j$ . However, this may not hold for all tax methods. When the regressive income tax is adopted, this condition always holds since  $1 - \gamma_i \geq 1 - \gamma_j \geq (1 - \gamma_j) \frac{I_j}{I_i}$ . When the progressive income tax is adopted, if  $I_i \geq I_j$ , then  $I_i - T_i \geq I_j - T_j$  requires  $1 - \gamma_i \geq (1 - \gamma_j) \frac{I_j}{I_i}$  holds.

**Lemma 2:** Suppose that a pivotal voter  $j$ , whose income is  $I_j^*$ , is indifferent to the choice between trade taxes and income taxes such that  $v_j(I_j^*, P_x, P_y + t) = v_j(I_j^* - T_j^*, P_x, P_y)$ . For an individual  $i$  with income  $I_i'$ , which tax policy gives a higher utility depends on both the income difference  $I_i' - I_j^*$  and the disposable income difference  $[(I_j^* - T_j^*) - (I_i' - T_i')]$ .

**Proof:**

$$\begin{aligned} v_j(I_j^*, P_x, P_y + t) &= v_j(I_j^* - T_j^*, P_x, P_y) \\ \Leftrightarrow a(P_x, P_y + t) + b(P_x, P_y + t)I_j^* &= a(P_x, P_y) + b(P_x, P_y)(I_j^* - T_j^*) \end{aligned}$$

When the individual's income is  $I_i'$ , the difference between utility  $v_i(I_i' - T_i', P_x, P_y)$  and  $v_i(I_i', P_x, P_y + t)$  is as follows:

$$\begin{aligned} &v_i(I_i', P_x, P_y + t) - v_i(I_i' - T_i', P_x, P_y) \\ &= [a(P_x, P_y + t) + b(P_x, P_y + t)I_i'] - [a(P_x, P_y) + b(P_x, P_y)(I_i' - T_i')] \\ &= [a(P_x, P_y + t) - a(P_x, P_y)] + [b(P_x, P_y + t)I_i' - b(P_x, P_y)(I_i' - T_i')] \\ &= [b(P_x, P_y)(I_j^* - T_j^*) - b(P_x, P_y + t)I_j^*] + [b(P_x, P_y + t)I_i' - b(P_x, P_y)(I_i' - T_i')] \\ &= b(P_x, P_y)[(I_j^* - T_j^*) - (I_i' - T_i')] + b(P_x, P_y + t)(I_i' - I_j^*) \end{aligned}$$

Marginal income utilities  $b(P_x, P_y)$  and  $b(P_x, P_y + t)$  are positive. The sign of  $v_i(I'_i, P_x, P_y + t) - v_i(I'_i - T'_i, P_x, P_y)$  depends on the income levels of  $I'_i$  and  $I_j^*$  and the income tax payment  $T'_i$  and  $T_j^*$ .

(1) If  $(I_j^* - T_j^*) > (I'_i - T'_i)$ , the first term  $b(P_x, P_y)[(I_j^* - T_j^*) - (I'_i - T'_i)]$  is positive. If  $I'_i > I_j^*$ , then the second term  $b(P_x, P_y + t)(I'_i - I_j^*)$  is positive. Therefore,  $v_i(I'_i, P_x, P_y + t) > v_i(I'_i - T'_i, P_x, P_y)$ .

(2) If  $(I_j^* - T_j^*) < (I'_i - T'_i)$ , the first term  $b(P_x, P_y)[(I_j^* - T_j^*) - (I'_i - T'_i)]$  is negative. If  $I_i < I_j^*$ , then the second term  $b(P_x, P_y + t)(I'_i - I_j^*)$  is negative. Therefore,  $v_i(I'_i, P_x, P_y + t) < v_i(I'_i - T'_i, P_x, P_y)$ .

(3) If  $(I_j^* - T_j^*) < (I'_i - T'_i)$ , the first term  $b(P_x, P_y)[(I_j^* - T_j^*) - (I'_i - T'_i)]$  is negative. If  $I'_i > I_j^*$ , then the second term  $b(P_x, P_y + t)(I'_i - I_j^*)$  is positive. Therefore, the sign of  $v_i(I'_i, P_x, P_y + t) - v_i(I'_i - T'_i, P_x, P_y)$  is uncertain.

(4) If  $(I_j^* - T_j^*) > (I'_i - T'_i)$ , the first term  $b(P_x, P_y)[(I_j^* - T_j^*) - (I'_i - T'_i)]$  is positive. If  $I'_i < I_j^*$ , then the second term  $b(P_x, P_y + t)(I'_i - I_j^*)$  is negative. Therefore, the sign of  $v_i(I'_i, P_x, P_y + t) - v_i(I'_i - T'_i, P_x, P_y)$  is uncertain. Q.E.D.

From Lemma 2, we know that the income tax and trade tax alternatives yield the same utility for the pivotal voter, i.e.  $v_j(I_j^*, P_x, P_y + t) = v_j(I_j^* - T_j^*, P_x, P_y)$ . For an individual with income  $I'_i$ , which tax alternative is preferred depends on both the individual income level  $I'_i$  and the disposable income  $I'_i - T'_i$ . Since the utility of each individual depends on his/her income, if

an individual has a higher income level, the individual's utility is also higher. As a result, when trade taxes are proposed, if the individual's income  $I'_i$  is larger than the income of the pivotal voter  $I_j^*$ , then trade taxes yield a higher utility to the individual  $i$ . Similarly, when income taxes are proposed, if the individual's disposable income  $I'_i - T'_i$  is larger than the income of the pivotal voter  $I_j^* - T_j^*$ , then income taxes yield a higher utility to individual  $i$ . That is to say, if  $I'_i > I_j^*$  and  $I'_i - T'_i < I_j^* - T_j^*$ , trade taxes yield a higher utility and income taxes yield a lower utility to individual  $i$  so the trade tax alternative is preferred. If  $I'_i < I_j^*$  and  $I'_i - T'_i > I_j^* - T_j^*$ , trade taxes yield a lower utility and income taxes yield a higher utility to the individual  $i$  so the income tax alternative is preferred. For the other cases, which policy is preferred by individual  $i$  is uncertain.

Nevertheless, Lemma 1 ensures that the ordering of an individual's income and disposal income is the same for both regressive and progressive income tax methods. That is to say, if  $I'_i \geq I_j^*$ , then the first term of the utility difference  $b(P_x, P_y)[(I_j^* - T_j^*) - (I'_i - T'_i)]$  is negative and the second term of the utility difference  $b(P_x, P_y + t)(I'_i - I_j^*)$  is positive. Therefore, the sign of the utility difference between trade taxes and income taxes is hard to decide. In addition, a voter with an income  $\bar{I}_i$  such that  $\int_0^{\bar{I}_i} f(I)dI = 1/2$  is called a median income voter. The median income voter is the median voter in this model because the ordering of individual income is the same as the ordering of individual utility. That is to say, the median income voter with  $\bar{I}_i$  divides voters into half according to their indirect utility. As a result, the position of the median income voter is decisive to the outcome of majority voting for a



country. The policy choice for alternative tax instruments can be obtained as follows.

**Proposition 1:** *Suppose that the income of a pivotal voter is  $I_j^*$  and the income of the median voter is  $\bar{I}_i$ . If  $b(P_x, P_y)[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] + b(P_x, P_y + t)(\bar{I}_i - I_j^*) \geq 0$ , a trade tax policy is preferred. Similarly, if  $b(P_x, P_y)[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] + b(P_x, P_y + t)(\bar{I}_i - I_j^*) \leq 0$ , an income tax policy is preferred.*

**Proof:**

From Lemma 1 and Lemma 2, we know that the utility difference for the median voter is as follows.

$$\begin{aligned} & v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \\ &= b(P_x, P_y)[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] + b(P_x, P_y + t)(\bar{I}_i - I_j^*) \end{aligned}$$

$b(P_x, P_y)$  and  $b(P_x, P_y + t)$  are positive. If  $(\bar{I}_i - I_j^*) \geq 0$  then  $[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] \leq 0$ . Therefore, the signs of the first and the second terms of the utility difference are never the same.

(1) If  $b(P_x, P_y)[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] + b(P_x, P_y + t)(\bar{I}_i - I_j^*) \geq 0$ , then

$v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \geq 0$ . A trade tax policy is preferred.

(2) If  $b(P_x, P_y)[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] + b(P_x, P_y + t)(\bar{I}_i - I_j^*) \leq 0$ , then

$v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \leq 0$ . An income tax policy is preferred. Q.E.D.

From proposition 1, which policy is preferred by the majority of voters depends on the level of marginal income utility, the income tax schedule and the

relative positions of the pivotal and median voters in the income distribution. However, it is difficult to see clearly how the sign of the utility difference changes. If the levels of marginal income utility  $b(P_x, P_y)$  and  $b(P_x, P_y + t)$  are assumed to be the same, a more clear-cut result of majority voting can be obtained as follows.

**Corollary 1:** Suppose that  $b(P_x, P_y) = b(P_x, P_y + t)$ . If  $\bar{T}_i \geq T_j^*$ , then the trade tax policy is preferred. If  $\bar{T}_i \leq T_j^*$ , then the income tax policy is preferred. Moreover, when a uniform income tax is used, which taxation policy yields a higher utility depends on the income level.

**Proof:**

$$\begin{aligned}
 & v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \\
 = & b(P_x, P_y)[(I_j^* - T_j^*) - (\bar{I}_i - \bar{T}_i)] + b(P_x, P_y + t)(\bar{I}_i - I_j^*) \\
 = & b(P_x, P_y)(\bar{T}_i - T_j^*)
 \end{aligned}$$

(1) If  $\bar{T}_i - T_j^* \geq 0$ , then  $v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \geq 0$ . Trade tax policy is preferred

(2) If  $\bar{T}_i - T_j^* \leq 0$ , then  $v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \leq 0$ . Income tax policy is preferred.

Suppose that the uniform income tax rate  $\gamma$  is used. The utility difference between the two taxation instruments is as follows.

$$\begin{aligned}
& v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \\
& = b(P_x, P_y)\gamma(\bar{I}_i - I_j^*)
\end{aligned}$$

(1) If  $\bar{I}_i - I_j^* \geq 0$ , then  $v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \geq 0$ . Trade tax policy yields a higher utility.

(2) If  $\bar{I}_i - I_j^* \leq 0$ , then  $v_i(\bar{I}_i, P_x, P_y + t) - v_i(\bar{I}_i - \bar{T}_i, P_x, P_y) \leq 0$ . Income tax policy yields a higher utility. Q.E.D.

It is quite clear that each individual prefers to pay less taxes to the government. If  $\bar{T}_i - T_j^* \geq 0$ , trade tax policy yields a higher utility and is preferred. Similarly, if  $\bar{T}_i - T_j^* \leq 0$ , income tax policy yields a higher utility and is preferred. As a result, if the relative income tax positions of the median and pivotal voters are known, the taxation choice through majority voting can be obtained. Moreover, if the uniform income tax rate is adopted, the ordering of individual income is equal to the ordering of individual income taxes. A clear-cut relationship between the income level and the taxation preferences can be derived. In fact, no matter which tax method is adopted, it is often true that the higher the level of income, the higher the level of income taxes. That is, if  $I'_i \geq I_j^*$  then  $T'_i \geq T_j^*$ . As a result, when a uniform income tax is adopted, if we know the relative income positions of the median voter and the pivotal voter, the utility difference between income taxes and trade taxes can be derived. Under these circumstances, what is the link between national income and the relative positions of the pivotal and median voters for different stages of economic development?

First of all, how does the position of the median voter in the income distribution change over time? Suppose that the national income increases from  $I^1$  to  $I^2$ . Since the government budget needs to be balanced, the uniform income tax rate also changes from  $\gamma^1$  to  $\gamma^2$  such that  $G = \gamma^1 I^1 = \gamma^2 I^2$ . The income tax rate decreases with economic growth, i.e.  $\gamma^1 > \gamma^2$ . As the economy of a country develops, although almost every individual income increases, the position of the median income voter depends on the shape of skewness in the income distribution.<sup>3</sup> When the economy is developed, the position of the median voter shifts as follows.

**Lemma 3:** *When the economy of a country is developed, the skewness of the income distribution is assumed to change from  $\mu_3^1$  to  $\mu_3^2$ . If  $\mu_3^2 \leq \mu_3^1$ , the income distribution becomes more skewed to the left. Therefore, the position of the median voter shifts to the right. If  $\mu_3^2 > \mu_3^1$ , the income distribution become more skewed to the right. Therefore, the shifted position of the median voter is uncertain.*

**Proof:**

Suppose that the average national income is  $I$ . The skewness of the income distribution  $f(I)$  is  $\mu_3 = E[(X - I)^3]$ . If  $\mu_3^2 = \mu_3^1$ , the shape of the income distribution remains the same. When the economy is developed, the income of the median income voter is therefore increased. The income position of the median voter shifts right. Similarly, if  $\mu_3^2 < \mu_3^1$ , the income distribution is more skewed to the left and therefore the position of the median voter shifts

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<sup>3</sup>The skewness of a distribution  $f(X)$  is measured by  $\mu_3 = E[(X - u)^3]$ , where  $u$  is the mean. If the tail is on the left hand side, the distribution is skewed to the left, i.e.  $\mu_3 < 0$ . If tail is on the right hand side, the distribution is skewed to the right, i.e.  $\mu_3 > 0$ .

to the right. However, if  $\mu_3^2 > \mu_3^1$ , the income distribution is more skewed to the right. The income position of the median voter is unknown. Q.E.D.

Secondly, what is the position of the pivotal voter over time when the income distribution changes? Since the government budget is balanced, we know that  $G = tY(P_x, P_y + t, I)$ . The tariff rate is a function of the price of both the domestic and foreign products and the income level, i.e.  $t = f(P_x, P_y, I)$ . When the national income increases, the tariff rate decreases from  $t^1$  to  $t^2$ , i.e.  $t^2 < t^1$ . The position of the pivotal voter changes with economic development as follows.

**Lemma 4:** *When the economy of a country is developed, the position of the pivotal voter shifts left.*

**Proof:**

Suppose that the pivotal voter with income  $I^*$  is indifferent to both income taxes and trade taxes in the early stage of economic development. That is,

$$\begin{aligned} v_j^1(I^*, P_x, P_y + t^1) &= v_j^1(I^* - T_j^*, P_x, P_y) \\ \Leftrightarrow a(P_x, P_y + t^1) + b(P_x, P_y + t^1)I^* &= a(P_x, P_y) + b(P_x, P_y)(I^* - T^*) \end{aligned}$$

As the economy is developed, if an individual has income  $I^*$ , the taxation utility changes as follows.

(1) The utility difference of trade taxes.

$$v_i^2(I^*, P_x, P_y + t^2) - v_j^1(I^*, P_x, P_y + t^1)$$

$$\begin{aligned}
&= a(P_x, P_y + t^2) + b(P_x, P_y + t^2)I^* - a(P_x, P_y + t^1) + b(P_x, P_y + t^1)I^* \\
&= a(P_x, P_y + t^2) - a(P_x, P_y + t^1) + b(P_x, P_y + t^2)(I^* - I^*) \\
&= a(P_x, P_y + t^2) - a(P_x, P_y + t^1) > 0
\end{aligned}$$

Since  $t^2 < t^1$ , we can get  $a(P_x, P_y + t^2) > a(P_x, P_y + t^1)$ . The utility difference of trade taxes is therefore positive.

(2) The utility difference of income taxes.

$$\begin{aligned}
&v_i^2(I^* - T^*, P_x, P_y) - v_j^1(I^* - T^*, P_x, P_y) \\
&= a(P_x, P_y) + b(P_x, P_y)(I^* - T^*) - a(P_x, P_y) + b(P_x, P_y)(I^* - T^*) \\
&= b(P_x, P_y)(1 - \gamma^1)I^* - (1 - \gamma^2)I^* \\
&= b(P_x, P_y)I^*(\gamma^2 - \gamma^1) < 0
\end{aligned}$$

Note that  $\gamma^1 > \gamma^2$ . The utility difference of trade taxes is negative.

As a result, the utility of trade taxes is higher than the utility of income taxes. An individual with income  $I^*$  in the later stage of economic development prefers trade taxes. The new pivotal voter must have a lower income level than  $I^*$  so that both taxation policies yield the same utility. Therefore, when the economy of a country is more developed, the position of the pivotal voter shifts left. Q.E.D.

When the national income increases, the new position of the pivotal and median voters can be derived as in Lemmas 3 and 4. If the skewness of the

income distribution is known, which tax policy is preferred through majority voting can be obtained as follows.

**Proposition 2:** *When national income increases, if the income distribution is skewed to the left, a country will adopt trade taxes. If the income distribution is skewed to the right, either trade taxes or income taxes can be adopted.*

From proposition 2, if the income distribution is more skewed to the left through time, the position of the median voter shifts to the right. Since the position of the pivotal voter always shifts to the left with economic growth, trade taxes are preferred through majority voting in the later stage of economic development. If the income distribution is more skewed to the right through time, the shifted position of the median voter is uncertain. Either trade taxes or income taxes would be preferred by the majority of voters when national income grows.

### 6.3 Example: The Cobb-Douglas Utility Function

Suppose that the utility functions of all individuals are Cobb-Douglas, which is a special case of the Gorman form. Each individual is assumed to maximize his/her utility function subject to his/her income. That is,

$$\begin{aligned} \text{Max} \quad & \alpha \ln x_i + (1 - \alpha) \ln y_i \\ \text{s.t.} \quad & p_x x_i + p_y y_i = I_i \end{aligned} \tag{8}$$

By using the Lagrange method, the individual's demand for both the domestic good  $X$  and the foreign good  $Y$  of consumer  $i$  and the individual's

indirect utility can be derived as follows:

$$\begin{aligned}
 x_i(P_x, I_i) &= \frac{\alpha I_i}{P_x} \\
 y_i(P_y, I_i) &= \frac{(1 - \alpha) I_i}{P_y} \\
 v_i(P_x, P_y, I_i) &= \ln I_i - \alpha \ln P_x - (1 - \alpha) \ln P_y
 \end{aligned} \tag{9}$$

If the domestic government imposes a specific tariff on the foreign product, the demand for the domestic and foreign products and indirect utility can be calculated as follows:

$$\begin{aligned}
 x_i(P_x, I_i) &= \frac{\alpha I_i}{P_x} \\
 y_i(P_y + t, I_i) &= \frac{(1 - \alpha) I_i}{P_y + t} \\
 v_i(P_x, P_y + t, I_i) &= \ln I_i - \alpha \ln P_x - (1 - \alpha) \ln(P_y + t)
 \end{aligned} \tag{10}$$

When an income tax policy is proposed by the government and the income tax payment of each individual is  $T_i$ , the demand for both domestic and foreign products and indirect utility can be obtained as follows:

$$\begin{aligned}
 x_i(P_x, I_i, T_i) &= \frac{\alpha(I_i - T_i)}{P_x} \\
 y_i(P_y, I_i, T_i) &= \frac{(1 - \alpha)(I_i - T_i)}{P_y} \\
 v_i(P_x, P_y, I_i, T_i) &= \ln(I_i - T_i) - \alpha \ln P_x - (1 - \alpha) \ln P_y
 \end{aligned} \tag{11}$$



Since each individual voter chooses between trade taxes and income taxes, the tax policy alternative which yields a higher utility is preferred.

**Lemma 5:** Suppose that the pivotal voter  $j$ , whose income is  $I_j^*$ , is indifferent to the choice between trade taxes and income taxes such that  $v_j(I_j^*, P_x, P_y + t) = v_j(I_j^* - T_j^*, P_x, P_y)$ . For an individual with an income  $I'_i$ , the choice between tax alternatives depends only on the income tax rate. If  $\gamma'_i \geq \gamma_j^*$ , then  $v_i(I'_i, P_x, P_y + t) \geq v_i(I'_i - T'_i, P_x, P_y)$ . A trade tax policy is preferred. If  $\gamma'_i \leq \gamma_j^*$ , then  $v_i(I'_i, P_x, P_y + t) \leq v_i(I'_i - T'_i, P_x, P_y)$ . An income tax policy is preferred.

**Proof:**

The utilities for trade taxes and income taxes are the same for a pivotal voter  $j$  with income  $I_j^*$ . That is,

$$\begin{aligned}
v_j(I_j^*, P_x, P_y + t) &= v_j(I_j^* - T_j^*, P_x, P_y) \\
\Leftrightarrow \ln I_j^* - \alpha \ln P_x - (1 - \alpha) \ln(P_y + t) &= \ln(I_j^* - T_j^*) - \alpha \ln P_x - (1 - \alpha) \ln P_y \\
\Leftrightarrow \ln I_j^* - (1 - \alpha) \ln(P_y + t) &= \ln(I_j^* - T_j^*) - (1 - \alpha) \ln P_y \\
\Leftrightarrow \ln I_j^* - \ln(I_j^* - T_j^*) &= (1 - \alpha)(\ln(P_y + t) - \ln P_y) \\
\Leftrightarrow \ln \frac{I_j^* - T_j^*}{I_j^*} &= (1 - \alpha) \ln \frac{P_y}{P_y + t}
\end{aligned}$$

For an individual with an income  $I'_i$ , the utility difference between trade taxes and income taxes can be calculated as follows:

$$v_i(I'_i - T'_i, P_x, P_y) - v_i(I'_i, P_x, P_y + t)$$

$$\begin{aligned}
&= [\ln(I'_i - T'_i) - \alpha \ln P_x - (1 - \alpha) \ln P_y] - [\ln I'_i - \alpha \ln P_x - (1 - \alpha) \ln(P_y + t)] \\
&= [\ln(I'_i - T'_i) - \ln I'_i] - [(1 - \alpha) \ln P_y - (1 - \alpha) \ln(P_y + t)] \\
&= \ln \frac{I'_i - T'_i}{I'_i} - (1 - \alpha) \ln \frac{P_y}{P_y + t} \\
&= \ln \frac{I'_i - T'_i}{I'_i} - \ln \frac{I_j^* - T_j^*}{I_j^*} \\
&= \ln(1 - \gamma'_i) - \ln(1 - \gamma_j^*) \\
&= \ln \frac{1 - \gamma'_i}{1 - \gamma_j^*}
\end{aligned}$$

The relationship between the utility difference and the income tax rate can be obtained as follows.

$$\begin{aligned}
&v_i(I'_i - T'_i, P_x, P_y) - v_i(I'_i, P_x, P_y + t) \geq 0 \\
&\Leftrightarrow \ln \frac{1 - \gamma'_i}{1 - \gamma_j^*} \geq 0 \\
&\Leftrightarrow \frac{1 - \gamma'_i}{1 - \gamma_j^*} \geq 1 \\
&\Leftrightarrow 1 - \gamma'_i \geq 1 - \gamma_j^* \\
&\Leftrightarrow \gamma'_i \leq \gamma_j^*
\end{aligned}$$

If  $\gamma'_i \geq \gamma_j^*$  then  $v_i(I'_i, P_x, P_y + t) \geq v_i(I'_i - T'_i, P_x, P_y)$ , then trade taxes are preferred. Similarly, if  $\gamma'_i \leq \gamma_j^*$  then  $v_i(I'_i, P_x, P_y + t) \leq v_i(I'_i - T'_i, P_x, P_y)$ , then income taxes are preferred. Q.E.D.

Since  $b(P_x, P_y)$  is a constant in the indirect utility of the Cobb-Douglas function, the choice of tax alternative depends on the income tax rate. For any individual with income  $I'_i$ , if the individual's income tax rate  $\gamma'_i$  is higher than the income tax rate of the pivotal voter  $\gamma_j^*$ , trade taxes are preferred. If

the individual's income tax rate  $\gamma'_i$  is lower than the income tax rate of the pivotal voter  $\gamma_j^*$ , income taxes are preferred. In addition, when progressive income taxes are adopted, if  $I'_i \geq I_j^*$ , then  $\gamma'_i \geq \gamma_j^*$ . Otherwise,  $\gamma'_i \leq \gamma_j^*$ . When regressive income taxes are adopted, if  $I'_i \geq I_j^*$ , then  $\gamma'_i \leq \gamma_j^*$ . Otherwise,  $\gamma'_i \geq \gamma_j^*$ .

**Proposition 3:** *Suppose that the income of the pivotal voter is  $I_j^*$  and the income of the median voter is  $\bar{I}_i$ . When progressive income taxes are adopted, if  $\bar{I}_i \geq I_j^*$ , then the trade taxation policy is preferred. If  $\bar{I}_i \leq I_j^*$ , then the income taxation policy is preferred. When regressive income taxes are adopted, if  $\bar{I}_i \geq I_j^*$ , then the income taxation policy is preferred. If  $\bar{I}_i \leq I_j^*$ , then the trade taxation policy is preferred.*

**Proof:**

From Lemma 5, we can get the following result.

If  $\bar{\gamma}_i \geq \gamma_j^*$ , then  $v_i(\bar{I} - T, P_x, P_y) \leq v_i(\bar{I}, P_x, P_y + t)$ .

If  $\bar{\gamma}_i \leq \gamma_j^*$ , then  $v_i(\bar{I} - T, P_x, P_y) \geq v_i(\bar{I}, P_x, P_y + t)$ .

Thus, the choice of tax alternative depends on the income tax rate. When progressive income taxes are adopted, if  $\bar{I}_i \geq I_j^*$ , then  $\bar{\gamma}_i \geq \gamma_j^*$ . Otherwise,  $\bar{\gamma}_i \leq \gamma_j^*$ . When regressive income taxes are adopted, if  $\bar{I}_i \geq I_j^*$ , then  $\bar{\gamma}_i \leq \gamma_j^*$ . Otherwise,  $\bar{\gamma}_i \geq \gamma_j^*$ . Q.E.D.

In general, a tax alternative is preferred by voters if less tax is paid to the government. As a result, the utility difference between the median voter for both trade tax policy and income tax policy depends on the income tax

payment, which is determined by the income and the income tax rate. When the income of the median voter is higher than the income of the pivotal voter, if progressive income taxes are adopted, then trade taxes are preferred. If regressive income taxes are adopted, then income taxes are supported through majority voting. Similarly, when the income of the median voter is lower than income of the pivotal voter, if progressive income taxes are adopted, then income taxes are preferred. If regressive income taxes are adopted, then trade taxes are supported through majority voting.

When the economy of a country is developed, assume that the income of the median income voter increases from  $\bar{I}_i^1$  to  $\bar{I}_i^2$  and the income of the pivotal voter changes from  $I_j^{*1}$  to  $I_j^{*2}$ . Which taxation policy alternative is preferred through majority voting depends on the income tax rate. As a result, if the income tax method is known, the choice of tax alternatives for different stages of economic development depends on the relative positions of the median voter and the pivotal voter in the income distribution.

**Corollary 2:** *When the domestic country adopts progressive income taxes for different stages of economic development, there are four possible cases.*

- (1) *If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , trade taxes are preferred by most people for both stages of economic development.*
- (2) *If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , income taxes are preferred by most people for both stages of economic development.*
- (3) *If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , first trade taxes and then income taxes are supported through majority voting.*

(4) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , first income taxes and then trade taxes are supported through majority voting.

When income taxes are progressive, if the income of the median voter is higher than the income of the pivotal voter, the individual income tax rate of the median voter is higher than the individual income tax rate of the pivotal voter. Therefore, trade tax policy yields higher utility for both stages of economic development. If the income of the median voter is lower than the income of the pivotal voter, the individual income tax rate of the median voter is lower than the individual income tax rate of the pivotal voter. Therefore, income tax policy yields higher utility for both stages of economic development. Similarly, if the income of the median voter is first larger and then smaller than the income of the pivotal voter for different stages of economic development, first trade tax policy and then income tax policy is supported. If the income of the median voter is first lower and then higher than the income of the pivotal voter for two stages of economic development, first income tax policy and then trade tax policy is supported.

**Corollary 3:** *When the domestic country adopts regressive income taxes for different stages of economic development, there are four possible cases.*

(1) If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , income taxes are preferred by most people for both stages of economic development.

(2) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , trade taxes are preferred by most people for both stages of economic development.

(3) If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , first income taxes and then trade taxes are supported through majority voting.

(4) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , first trade taxes and then income taxes are supported through majority voting.

**Corollary 4:** When the government adopts progressive income taxes first and then switch to regressive income taxes, there are four possible cases.

(1) If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , first trade taxes and then income taxes are supported through majority voting.

(2) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , first income taxes and then trade taxes are supported through majority voting.

(3) If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , trade taxes are preferred by most voters for both stages of economic development.

(4) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , income taxes are preferred by most voters for both stages of economic development.

**Corollary 5:** When the government adopts regressive income taxes first and then switch to progressive income taxes, there are four possible cases.

(1) If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , first income taxes and then trade taxes are supported through majority voting.

(2) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , first trade taxes and then income taxes are supported through majority voting.

(3) If  $\bar{I}_i^1 > I_j^{*1}$  and  $\bar{I}_i^2 < I_j^{*2}$ , income taxes are preferred by most people for both stages of economic development.

(4) If  $\bar{I}_i^1 < I_j^{*1}$  and  $\bar{I}_i^2 > I_j^{*2}$ , trade taxes are preferred by most people for both stages of economic development.

Using the same reasoning as above, the choice between tax alternatives depends on the relative levels of income for the median voter and the pivotal voter. For any stage of economic development, when progressive income taxes are adopted, if the income of the median voter is higher than the income of the pivotal voter, trade taxes are adopted. If the income of the median voter is lower than the income of the pivotal voter, income taxes are adopted. Similarly, when regressive income taxes are adopted, if the income of the median voter is higher than the income of the pivotal voter, income taxes are adopted. If the income of the median voter is higher than the income of the pivotal voter, trade taxes are adopted. As a result, if the relative positions of the median voter and the pivotal voter in the income distribution and the type of tax method are known, the relative levels of income tax rates for the pivotal voter and the median voter can also be derived. Therefore, the outcome of majority voting between income taxes and trade taxes for two stages of economic development can be obtained.

## 6.4 Conclusion

This chapter has proposed a political economy explanation for the issue concerning the choice among taxation alternatives. The existing explanation does not illustrate why trade taxes instead of more efficient income taxes are

adopted as a taxation policy for many countries in the policy-making process and why the taxation choice might change through economic development. In this chapter we show how different taxation policies are supported through majority voting in a democratic political system. In general, voters prefer to pay lower taxes to the domestic government and therefore the outcome of majority voting on taxation policy relies on the tax methods and the relative positions of the median voter and the pivotal voter in the income distribution. If the income tax of the median voter is higher than the income tax of the pivotal voter, trade taxes are more likely preferred. Otherwise, income taxes are preferred. When the economy of a country is developed, it is possible that the country will adopt trade taxes in the early stage of its economic development, and will then adopt income taxes in the later stage of economic development. If Cobb-Douglas utility is used, the taxation choice depends on the income tax rate. All possible cases which links the income tax method and the economic development are also discussed.

Since politicians care about the response of voters in a democratic society, a policy supported by the majority of voters is adopted. By using this political economic reasoning, the choice among taxation policy alternative is explained. Nevertheless, majority voting is seldom used for trade policy issues in practice. In addition, the individual's indirect utility is assumed to take the Gorman form because it is the most general function that can be used to achieve an aggregation of representative individuals. Since the focus is on the relationship between the income level and voting choice, all individuals are assumed to have identical preferences. If individuals have different preferences, the reasoning



is still valid. However, it is difficult to reach specific conclusions since the relative positions of the median voter and the pivotal voter are difficult to calculate. In addition, the assumption of a balanced budget is also made so that aggregate income taxes and trade taxes should be equivalent. In fact, the government budget is seldom balanced and the level of government spending is also determined in the political process. How the government decides the level of government spending and achieves the goal of budgetary balance in the political process may be undertaken in future research. Finally, cross-country empirical research about the choice between tariffs and income taxes might be conducted in order to test the hypothesis obtained in this chapter.

## Chapter 7 Conclusion

The political economy of trade policy is an important and controversial topic in the international trade field. In order to produce better policy, an understanding of the policy-making process is needed. The purpose of this research is to see how politics can influence trade policy formulation. Four papers are presented in this thesis which concerns two major issues of trade policy-making: strategic lobbying and the choice among taxation methods.

In order to understand how export subsidies are influenced by lobbying activities in the policy-making process, a lobbying-influence model, based on a two-stage game framework, is built in chapter 3. Not only can government set a subsidy in order to maximize the social welfare as suggested in the strategic trade policy literature, but also firms themselves can organize interest groups through lobbying activities in order to promote their special interests. Since both the welfare-maximizing model of strategic trade policy and the lobbying-influence model of political economy are based on the same methodology of game theory, a comparison between these two models is provided. The results suggest that the domestic firm will offer a greater lobbying contribution if the market demand and the lobbying influence parameter are higher, and the marginal costs of the domestic firm are lower. When the lobbying influence parameter is zero, the lobbying subsidies obtained by the domestic firm are

always zero, irrespective of the lobbying contribution offered by the domestic firm. Therefore, the domestic firm would not engage in lobbying activities because no benefits can be obtained. In addition, if export subsidies are determined by the level of lobbying contribution, some testable hypothesis are available as follows: (1) The more efficient industries will offer more lobbying contribution in order to get higher subsidies. (2) The industries have higher incentive to engage in lobbying activities if the market demand is larger. (3) The relationship between the lobbying influence parameter and the export subsidies is positive.

It is quite clear that export subsidies can shift the profits of the domestic firm, and that the domestic firm will engage in lobbying activities only if its profits are increased. Therefore, the profits of the domestic firm under both the welfare-maximizing and lobbying-influencing models are higher than the profits of the domestic firm under a free trade policy. The domestic firms always have an incentive to engage in lobbying activities. However, lobbying activities are a kind of rent-seeking behaviour, the lobbying contributions are a dead weight loss. That is to say, the social welfare under both the welfare-maximizing model and a free trade policy are higher than the social welfare under the lobbying-influence model. The strategic trade argument, that a subsidy policy can increase social welfare in a duopoly market, does not hold in the lobbying-influencing model.

In contrast with strategic trade policy, export subsidies are assumed to be determined by the level of lobbying contribution in the lobbying-influence

model. As a result, governments are quite passive and only the demand side of trade policy-making is incorporated. In other words, the lobbying-influencing model fails to consider the supply side of trade policy-making and only uses the lobbying influence parameter to express the response of a government. For simplicity, the lobbying-subsidy function  $s(l) = kl^{1/2}$  is assumed in the model. The relationship between export subsidy and lobbying contribution should satisfy the following properties: (1) the higher the lobbying contribution, the higher the export subsidies, (2) the marginal return of lobbying activities is decreasing. As a matter of fact, the lobbying influencing parameter and the functional form depend upon the type of political system. In other words, even if the lobbying contribution is the same, the export subsidies obtained by interest groups still vary for different types of political system. We need to understand more about the link between the lobbying influence parameter and the functional form with the type of political system. More work specifying the institutional setting, combining both the supply and demand sides of trade policy-making, should be undertaken in order to produce a more complete picture on the trade policy-making.

Chapter 4 investigates the issue of the determinants of asymmetric lobbying. The results suggest that the incentive of the domestic firm to engage in lobbying activities varies with its marginal costs in both the complete and incomplete information cases. The domestic firm spends more money on lobbying activities if it is more cost competitive. That is why different levels of protection subsidies are obtained by the domestic firm with different marginal costs. When information over cost competitiveness is incomplete, both the

pooling equilibrium and the separating equilibrium can be found, but only the separating equilibrium is self-enforcing. At the separating equilibrium, if cost competitiveness is of the high type, the domestic firm offers zero lobbying contribution. If cost competitiveness is of the low type, the domestic firm offers a positive lobbying contribution, which is higher than the full information case in order to reveal its private information. Signalling is costly. As a result, the profits of the domestic firm under the separating equilibrium are lower than those under the full information case. In addition, since the social welfare of the domestic country is equal to the profits of the domestic firm in the export subsidy case, the level of social welfare under the separating equilibrium is also lower. A new explanation is provided of how the external environment influences the incentives of an interest group to engage in lobbying activities, and therefore why the lobbying outcomes are different.

Not only the cost competitiveness but also the level of market demand and the lobbying influence parameter can influence the incentives of the domestic firm to engage in lobbying activities. When the information over these variables are incomplete, more work may be done in order to get a complete picture of how external environment determines asymmetric lobbying. In addition, the assumption made on the nature of competition can also be extended. First of all, if firms are assumed to compete in Bertrand rather than in Cournot duopoly, future research can follow Ireland (1993) to examine how private information can be revealed through lobbying activities. Secondly, competition among interest groups can also influence the results of lobbying activities (Becker 1983, 1985). Therefore, future research can also examine the effects of

cost competitiveness on asymmetric lobbying when both the domestic and foreign firms also compete in providing lobbying contribution in order to influence the level of subsidy.

Chapter 5 investigates the issue of the positive role of lobbying activities in an incomplete information setting when potential foreign entry is considered. The results suggest that both the separating and pooling equilibria exist. When the expected profits of entering the market are negative, the foreign firm will stay outside the market. The domestic firm of both types offers zero lobbying contribution, which is the same as in the full information case. The pooling equilibrium is the refined equilibrium. When the expected profits of entering the market are positive, the foreign firm might enter the market. At the same time, the separating equilibrium is the refined equilibrium. The domestic firm offers a zero lobbying contribution if its cost competitiveness is of the high type; and it offers a positive lobbying contribution if its cost competitiveness is of the low type. Nevertheless, signalling is costly. The profits of the domestic firm under the separating equilibrium are lower than those under the pooling equilibrium. In addition, social welfare under the separating equilibrium is also lower than social welfare under the pooling equilibrium. When the domestic firm engages in lobbying activities and reveals its private information, social welfare still decreases. No positive role for lobbying activities is found in the incomplete information case when potential entry of a foreign firm is incorporated into the model. Lobbying activities should be banned by the government. In the public choice literature, Rasmusen (1993), Lohmann (1995) and Larserlof (1997) have showed that there is a positive role for lobby-

ing activities when the information is incomplete. However, these models do not consider the possibility of potential entry. When international competition is considered, the actual and potential threats of foreign firms are important for trade policy-making.

Nevertheless, the results suggested in this chapter are not robust and rely on the content of social welfare. Since both the domestic and foreign firms are assumed to compete in the third market, the social welfare of the domestic country is equal to the profits of the domestic firm. If the profits of the domestic firm under the pooling equilibrium are higher than those under the separating equilibrium, social welfare decreases when lobbying activities occur. However, if firms are assumed to compete in the domestic market, the social welfare of the domestic country is equal to the sum of the consumer surplus and producer surplus. In this case, when lobbying activities occur, the change of social welfare is uncertain and depends on specific conditions. Lobbying activities might still have a positive role even if the potential foreign entry is incorporated. In addition, since there is no foreign firm in the market in the first period, when the domestic firm engages in lobbying, no export subsidies are actually obtained. The lobbying contribution only serves the purpose of signalling. If some foreign firms are in the market in the first period, lobbying subsidies can shift the profits of the domestic firm in the first period and therefore the social welfare is likely to increase as well. Therefore, more research should be conducted in order to see how different settings affect the impact of lobbying activities on the change of social welfare.

One of the key problems in the strategic trade policy literature is that of how the government can obtain private information in order to set their trade policy. In chapter 4 and 5, we know that lobbying contribution can work as a signal to reveal private information in the lobbying-influencing model. Consequently, lobbying activities might also provide information in the welfare-maximizing model and therefore help the government to make the right policy when information about the industry is incomplete. Some market variables such as outputs have been widely used as a revealing mechanism in the strategic trade policy literature. However, there is no distortion of the product market when lobbying contribution is used. As a result, lobbying contribution might be a better signalling method in the welfare-maximizing models, and more representative of the real world, than the other mechanisms. In addition, the functions of lobbying contributions have not been settled in the literature. On the one hand, lobbying contributions are used to influence outcomes of a policy (Grossman and Helpman, 1994). Politicians are willing to serve an interest group's wish, and to deviate from a policy position of public interest. On the other hand, lobbying contributions are intended to increase the elected probability of a preferred party. Interest groups can support a party if its policy position is more favorable (Magee, Brock and Young, 1989), or if it acts as the agent on the principal's behalf (Hall and Wayman, 1990). More work might be conducted to understand different roles of lobbying activities in the policy-making process.

Chapter 6 investigates the issue of why different taxation policies are adopted according to the stage of a country's economic development. Assume that in



a democratic society, individuals can vote for their preferred taxes, and that a policy which yields the highest utility is adopted by the government. Suppose that the preferences of all individuals take the Gorman form. We show why trade taxes rather than more efficient income taxes is supported through majority voting even if taxes are revenue equivalent. The results suggest that the choice between trade taxes and income taxes depends on the level of income taxes, which are determined by the income tax methods, the relative income level between the median and pivotal voters in the income distribution, and the movement of income distribution over time. In addition, an example of the Cobb-Douglas utility function, which is a special case of the Gorman form, is discussed. When progressive income taxes are adopted, if the income tax rate of the median voter is higher than that of the pivotal voter, trade taxes are more likely to be chosen. Otherwise, income taxes are preferred. Similarly, when regressive income taxes are adopted, if the income tax rate of the median voter is higher than that of the pivotal voter, income taxes are more likely to be chosen. Otherwise, trade taxes are preferred. Therefore, it is possible that the domestic country will adopt trade taxes in the early stage of its economic development, and will then adopt income taxes when it becomes rich. It should be pointed out that the current literature neglects the following political economy issues: (1) How a taxation policy is politically accepted as a source of tax revenue. (2) The nature of the political economy relationship between different tax instruments and economic development. A new political economy explanation of the choice among taxation methods is provided in this chapter.

Although politics do have an impact on economic policy-making, the majority voting is seldom used for trade policy issue in practice. Nevertheless, this analysis provides political economy reasoning explaining the choice among policy alternatives. The choice among policy alternatives is an important topic from a political economy of trade policy point of view. On the one hand, future work should try to specify the mechanism which governs the choice of one policy over another in the policy-making process. For example, the role of legislative organization in the policy formulation. On the other hand, cross-country empirical research about the choice between tariffs and income taxes might also be conducted. Furthermore, many issues around this policy choice approach might be pursued in future research. For example, many developing countries try to liberalize their trade policy. Should they switch from tariffs policy to a free trade policy? Or should they give up import-substitution policies for export-expansion policies? In addition, the speed of trade liberalization is also important. Should the government remove trade protection immediately or should do it gradually (Falvey, 1994 ; Falvey and Kim, 1992)? All issues should not only consider economic dimension but also needs to include political considerations. Perhaps more attention to trade policy-making using a political economy analysis can reduce the gap between the suggestions of economists and the practice of trade policy.

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